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SEDLEY'S BRIDGE.

We give herewith a cut from a photograph of a bridge erected at Bassein, Bombay Presidency, on Sedley's system of rigid suspension. The total length of the bridge is 168 feet; centre span 60 feet; two side spans 54 feet each. The piers, it will be observed, were formed of screw piles, and the anchorage at the extreme ends on sandy or clay soil can also be made with screw piles, or in the usual way with masonry.

So far as we know, this plan of bridge has never been introduced into this country. For many locations it seems to have advantages, which no other plan possesses. One very important one is, that the bridge can be erected without any scaffolding or "false works," and at any height. The two side spans are first

Contributions.

A FEW HINTS TO INVENTORS.

BY WM. S. HUNTINGTON.

A vast amount of labor, thought and capital is uselessly expended by inventors and mechanics who are laboring to produce something new and valuable. Many a man sets his mind on the perfection of some improvement which he thinks would be valuable, and which he verily believes has not been known or used, or even thought of, by any person but himself; but after racking his brains for days and months, and spending many sleepless nights and anxious days, together with his hard earnings, he finds that another has gone before him—

genious men would ascertain before beginning work on a new invention, which seems to them to be valuable, whether it would be of any practical utility when completed, and act accordingly, a great deal of time, labor and money would be saved. They should also ascertain as far as possible what has been done by others in the same direction. This can be done by reference to the Patent Office reports; and if the information gained thereby is not satisfactory, it is a matter of economy to employ a reliable patent solicitor to make a preliminary examination at the patent office, which service will be performed for a fee of five dollars, and will often decide whether it is best to proceed or not. It frequently happens that a preliminary examination discloses the fact that a device similar in some respects to the one contemplated, and for the same



SEDLEY'S BRIDGE.

erected, anchored down, and the centre span is then built on each pier. The short centre bridge is raised to position and unites the two sides.

"The writer says, 'In all bridge construction in iron, except arched bridges and the ordinary suspension bridges, it is for strength, to place the greatest weight in the centre; but in this principle of rigid suspension, excess of weight in the centre is entirely dispensed with.'"

The details of this bridge are more like the European than the American practice, and in this direction there is probably room for improvement but the general plan or "motive" of the bridge seems worthy of consideration and adoption.

The weight of the bridge shown above, which was eight feet wide, was fifteen tons. It cost in England £397.

CAR WINDOW PROTECTOR.

Mr. W. M. K. Thornton, of Rolla, Mo., has invented an attachment to be applied to the exterior of passenger coaches, before each window. It consists of a light rectangular brass frame, from six to eight inches wide and a trifle longer than the height of the car window before which it is to stand. To three sides of this frame there is fastened a web of flannel, or other suitable material, gathered at the top and left free at the bottom so as to fill, and divert the current of air which the motion of the train produces. The inside of the frame is pivoted at a point a little above its centre so that the top of the frame will always incline in the direction of the motion of the car, and this inclination is limited by the pin and slot shown in the drawing.

The cost of applying these protectors is quite small, while the additional comfort to passengers, in those seasons of the year when the windows are kept open, is considerable, since sufficient purified air finds its way through the meshes of the flannel to prevent suction and a too strong outward draught at the window. These additions need not in any way detract from the fine appearance of the exterior, indeed, when appropriate colors are used, the effect of thus hanging the banners on the outer walls will be rather picturesque than otherwise.

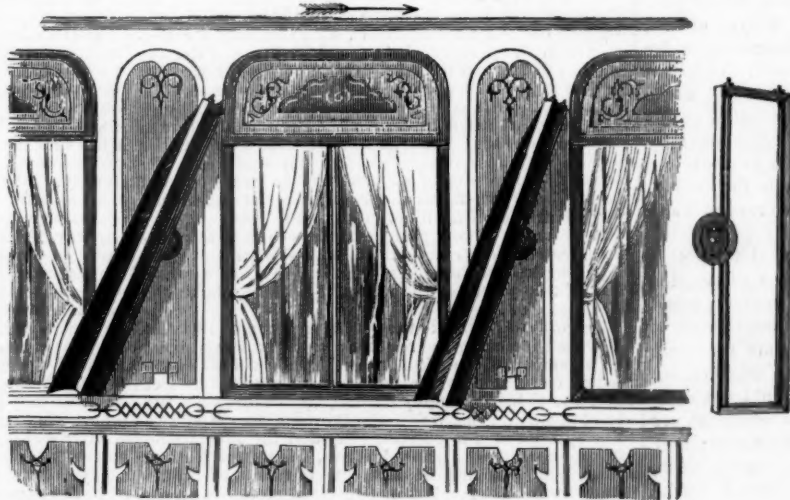
some one else has produced substantially the same thing and perhaps is reaping a rich harvest from it. Thousands have had a sad experience in this way, there are others who succeed in making their contrivances operate to their satisfaction and to answer the ends sought for, but find when they offer it to the public that there are other devices in use for the same purpose which are altogether preferable. Others, fancying that some device for a certain purpose would be valuable, when they set themselves at work to bring it before the pub-

purpose, has been previously invented. This enables the inventor to steer clear of others, at great saving of trouble and expense, and has on many occasions, been the means of an inventor producing something valuable to himself and to those for whom its use was intended.

The railroad community is in want of a great many improvements, and the improvement of railroad appliances affords a wide field for the labor of inventors; and now that railroad managers are beginning to see the benefit of improvements and are taking more liberal views in regard to them, it would seem to be a profitable one. If railroad men would make known the requirements of needed improvements, it would be greatly to their advantage. Inventors would not then be laboring in the dark; they could work in the right direction and understandingly, without a useless waste of time and money. For the benefit of railroad men, and those who are laboring to produce useful contrivances for railroad operations, I will here mention a few improvements which are needed, and offer some hints as to their requirements.

An Automatic Car Coupling is wanted; one by which a freight train may be uncoupled from the top of the car, and it should be so constructed that cars may come in contact without being coupled unless desired. This may be accomplished by a "set" of

simple construction, so that by the movement of a trigger cars may be allowed to run together without becoming coupled. The same simple operation reversed would "set" the arrangement so that the cars would become coupled when they run together. Much trouble is occasioned by some of the self coupling arrangements now in use, especially in running way freights. In doing the shifting at way stations it is frequently necessary to "throw a car on the turnout," for the purpose of cutting out a car, and if there are other cars on the side-track they will shackle, in which case they must be uncoupled before pulling out, which usually causes trouble and delay. There is a great number of self-coupling devices, but most of them are nuisances on this account. Another requirement of a



CAR WINDOW PROTECTOR.

lic, learn to their dismay that the public do not want it—that it does not possess any marketable value. Thousands of dollars have been thrown away by hard working inventors, in the hope of producing something of great value in railroad operations, whose hopes ended in disappointment. Not that they fail in carrying out their designs; but the device itself, does not answer any desirable end, or, in other words, that nothing of the kind is needed.

One who has had no opportunity to observe, or has not given attention to the matter, would be astonished at the great number of useful inventions that have been patented. The models of some of these are costly, and give evidence of great ingenuity and mechanical skill and taste, but are of no utility whatever. If these in-

first-class self-coupler, is the coupling of cars of different heights.

Just here it may be proper to say that the use of cars of different heights should be abandoned as soon as possible. A great deal of trouble, delay and accident is occasioned by their use, and there seems to be no reason why all cars should not be built of uniform height, from Maine to California, and from Quebec to Texas. In some cases the variation in the cars of different roads is so great as to require three links to couple them, and as these are not always at hand, it is difficult to shackle in a safe manner. Trains often pull apart because improperly shackled, when varying considerably in height, and many serious accidents have resulted from this. With a little attention to this, a serious evil may be remedied; and when an automatic coupling is produced answering all the requirements, it must be universally adopted in order to secure any benefits from it. It would be a nuisance rather than an advantage to have the cars on a few roads furnished with such an apparatus while others were not, for reasons which are obvious. This fact should be sufficient to stimulate inventions, as he who will offer a coupling with sufficient merit to warrant its general adoption is sure of fame and fortune.

Another inviting field for inventors is in the desired improvements in car-brakes. Although much ingenuity has been expended on tracks, (and some of them are very efficient), there is yet room for great improvements in these indispensable appliances. It is not desirable to dispense with the ordinary hand-brake, that being necessary to control the movements of single cars when detached from the train. A system of brakes should be so arranged as to be operated by the engineer, and he should know exactly to what extent they may be relied on in case of danger. It is also important that they be arranged with a special view to convenience in attaching and detaching cars to or from the train. In regard to the power used to operate car brakes, that which can be applied with the greatest economy would stand the best chance of general adoption, and from the results of recent experiments it would seem that steam is preferable to any other power, both in point of economy and convenience of application, as well as reliability in operation; but as this matter will form the subject in a future article, I will only say here that there is greater activity among inventors on this subject, than there ever has been heretofore, and the railroad managers are taking a more lively interest in it than usual, so it would be well for those who are contemplating improvements in brakes to remember that delays are dangerous, and that "the early bird catches the worm."

There is a demand for an improved mode of handling freight. The present mode of loading and unloading certain kinds of freight is slow and expensive. An arrangement by which an entire car-load of freight may be unloaded in the same time now occupied in wheeling a truck from the cars to the warehouse is among the possibilities, and cars may be loaded with the same facilities. Of course this cannot be effected without some alteration in the present style of cars, and the warehouses would have to be arranged especially for the purpose; but all this, together with the necessary tackling, need not be expensive. As the whole world is interested in the rates of transportation and as there cannot well be any great reduction of present rates on account of the expense of handling, it is clear that the inventor of the right kind of apparatus for the safe and rapid handling of freight, will be well rewarded and regarded as a public benefactor.

The number of persons killed and injured in getting on and off trains is painfully great, and an invention that will effectually prevent this class of accidents would be well received. Many attempts have been made to produce something of the kind, and some roads are using an arrangement which is said to be effective, but as it does not come into general use, it would not seem to be all that is desired. Many of these accidents are occasioned by faulty construction of platforms; they being either too low or too high, too far from the track, or too close to it. Many of them are too short, and some of that numerous class of passengers who get off the train at every station for no particular purpose and never get aboard until the train is in motion, tumble off from the end in their eagerness to gain a foothold on the train, and are killed or seriously injured. Although it is not always the fault of the company or its managers that these accidents occur, yet they are expected to employ all means in their power to prevent them. Who is the lucky one to contrive an effective means of preventing this class of accidents.

The passage from car to car while the train is in motion is dangerous, and fatal accidents by persons falling between cars are not infrequent. Several devices for rendering the passage safe have been contrived and some of them patented. Several years since a very simple and efficient contrivance for the purpose was attached

to the coaches of the Ogdensburg & Lake Champlain road, by Mr. Klohs, the Master Mechanic. The arrangement consisted of a series of thin flat bars of iron, crossing each other diagonally and fastened at each intersection with loose bolts or rivets, which formed a very neat and tasty bridge over the spaces between cars, capable of contraction and expansion sufficient to accommodate itself to any position the cars might acquire in relation to each other when coupled. This device was so arranged as to be readily swung over upon the platform, so as to offer no hindrance in coupling or uncoupling. After this neat little contrivance had been in use fifteen years or more, and hundreds of thousands of passengers had trod upon it with feelings of confidence and security from danger, some remarkable genius took out a patent for exactly the same thing. This is one instance of the many that might be mentioned, of the looseness with which affairs at the Patent Office are sometimes managed, and serves to illustrate the importance of employing none but men of known integrity and experience to conduct their affairs at the Patent Office.

The frequency of accidents at road crossings suggests a better mode of prevention than has yet been introduced, and the fearful loss of life in some cases of collisions, caused by cars "telescoping," affords a profitable field for some inventive mind.

These are only a few of the most important improvements needed, and it should be borne in mind by those who are laboring to prevent injury to life and limb that frequently a device which saves life in one way destroys it in another, and this fact should not be lost sight of by inventors.

Great Union Depot in St. Louis.

Plans have been perfected and submitted to the Executive Committee of the Illinois & St. Louis Bridge Company for the proposed grand union passenger depot, merchants exchange, and hotel, at St. Louis, of which the *St. Louis Times* gives the following description:

As proposed, the building will occupy a front of 226 feet 6 inches on Fifth street and 927 feet 7 inches on Washington avenue. The boundaries will be fifth street on the east, Washington avenue on the south, Eighth street on the west, and Green street on the north.

The "track-floor," 20 feet below the level of the streets, will be 207 feet wide, and extend from Fifth to Eighth street, with the necessary space east of Fifth street and west of Eighth street to enter the tunnel at either end.

There will be ten tracks between Washington avenue and Green street, and four tracks under Washington avenue; also, six platforms, from 20 to 24 feet wide, with broad stairs from the platforms to the waiting-rooms above.

The streets (Washington avenue, Sixth and Seventh streets) will be supported on iron columns, girders and joists, and covered with the Nicholson pavement.

The entire three blocks will be covered with buildings, the exterior walls of which will be built of cast iron, and the interior walls of brick. The group of buildings covering the block from Fifth to Sixth street, will be four stories high, with a French roof above, and it is proposed to include in them a merchant's exchange and hotel, with a banking house on the corner. In the first story, and in the west end of the block, will be six baggage rooms for the railroads, with elevators for baggage from the platforms below, and tracks to distribute baggage from room to room. On the lower story will be the office, reading-rooms, billiard, and bar-room, table d'hôte, barber shop, wash-room, etc., etc., of the hotel. An open court in the interior will be entered from Sixth street, with a large light shaft in the same to track floor below; with an entrance also on Fifth street. The second floor is planned for the merchants' exchange and the ordinary parlors, carving-room, pantries and stores, reception-rooms, bath-rooms, etc., of the hotel.

There are to be two grand entrances to the exchange-room, from Fifth street and from Washington avenue. Adjoining will be the telegraph office. The rooms and offices for employees of the railroads will be above the baggage-rooms.

It is proposed to make the exchange proper 180 feet by 90 feet, including the reading-room, secretary's room, and a number of committee rooms, arranged with all the modern conveniences; the exchange-room to be 40 feet high, and to be thoroughly lighted by windows in the south, north and east walls; the third and fourth stories to be appropriated to guests' rooms, and the fifth to the kitchen, laundry and general stores, boilers, machinery, and general working departments of the hotel. This fifth story is to be reached by four large elevators.

In the first story of the block, between Sixth and Seventh streets, will be the ladies' and gentlemen's waiting rooms, ticket and telegraph offices, with stairs from the waiting rooms to the tracks below. On Washington avenue there will be room for seven large offices, and seven on Green street. In the first story, from Seventh to Eighth streets, there will be fourteen offices on Washington and Green streets, and on Eighth street, Washington avenue and Green street, three large express offices. In the second, third and fourth stories of the buildings will be 330 commodious offices and rooms, independent of those designed for guests' rooms in the hotel.

The whole space between the buildings on Washington avenue and Green street, from the east side of Sixth street to the rear of the building on Eighth street, will be covered by a dome-shaped glass roof, 700 feet long by 135 feet wide.

The general style of the exterior will be Franco-Italian.

The following roads will use the passenger depot: Missouri Pacific, North Missouri, and the St. Louis, Council Bluffs & Omaha, and St. Louis & Keokuk, both of which come in on the North Missouri Railroad track; South Pacific, Iron Mountain, St. Louis & Indianapolis, St. Louis, Vandalia & Terre Haute, St. Louis & Chicago, Ohio & Mississippi, Decatur & East St. Louis, St. Louis & Belleville and its eastern connections, St. Louis & Southeastern.

It is proposed to use smoke-consuming engines for the purpose of bringing trains into and out of the tunnel and depot; and, by means of deadening the floors and operating the trains with signals, no noise will be created, and the floors above will suffer no inconvenience from this source.

The Artisan in Denmark, Spain, Portugal and Greece.

Shakespeare's line,

"Something is rotten in the state of Denmark,"

might be fittingly prefixed to Mr. Strachey's report, which paints the Danish operatives' position in anything but bright colors—a thing not to wonder at if it be true that nine out of ten old workmen have to go to the parish for relief. The Dane is better paid than the Swede, but he has fewer opportunities of bettering himself, most masters being their own foremen. The numerical proportion of men to masters, in Denmark, is a curious one, in Copenhagen there being only thirteen men to every ten masters, while in the country at large there are actually ten masters to every two journeymen! The hours of labor are long, extending from twelve or thirteen up to fifteen hours, with half time on Sundays. Thanks to some philanthropic capitalists, some half dozen building societies have been started with tolerable success, although those for whose benefit they are intended have not displayed any over eagerness to take advantage of them.

In the capital the workman is contented to live in the back part of a several storied house, generally in a cellar or half underground room, opening upon a dingy court nine or ten feet square. Light and ventilation are limited, and the windows are generally kept closed to exclude the effluvia from the latrines and gutters, which render Copenhagen almost unmatchable for general and special smells. Single men share a room between them. Family men live in unfurnished lodgings, consisting of two rooms and a kitchen, often getting their rough furniture upon hire.

Vituals are cheaper than in England, but quality is not so good, first-rate meat being unobtainable at any price in the capital itself, where the workman's daily expenditure is estimated at thirty-six cents a day. His clothing, that is, what is indispensable, costs him from \$15 to \$20 a year; but as he is anxious to pass for a gentleman on Sundays and holidays, it amounts hardly suffices.

With one thing and another it is calculated that the Dane cannot well subsist upon less than five dollars a week, which the majority of working men cannot earn; and even this calculation is founded on the assumption, that his wife, if he has one, supports herself and children, although she cannot, in ordinary cases, make more than a shilling a day and her food. Some do contrive to save, it is true. Of 16,786 depositors in the savings banks, in 1866, 1,265 were operatives; but a sum of \$250 is looked upon as enormous for any artisan to accumulate by the time he reaches his fiftieth or sixtieth year.

A competent authority in Denmark wishing to illustrate the disinclination of the Dane to provide for "a rainy day," observed: "Where one Danish working-man saves a dollar the Englishman saves fifty dollars." Trades' unions are unknown in Denmark, and strikes almost so, only three having taken place since 1848. The Dane is more sober and more moral than the German, but neither so frugal nor so industrious; he has yet to learn the meaning of the word *work*. Like the German he enjoys the benefit of an admirable system of obligatory popular education, and has an excellent cheap press; but he only supplies an illustration of a truth that cannot escape any one who peruses the reports from which we have drawn our information; namely, that in manual as in more intellectual occupations something besides education is required for the achievement of superiority. With all his advantages in the way of instruction, neither Dane, Swede, nor German can turn out such work as the Frenchman and Englishman.

It is customary in some parts of Russia to place a board at the entrance of a village to inform travelers how many men and oxen it can boast, but the fair sex are not thought worthy of enumeration. In the countries of Southern Europe, the industrial population would seem to count for as little as the women in Russia, if we may judge from the difficulty in obtaining any information respecting them and their belongings.

After waiting four months for information promised by the Spanish officials on the subject, Mr. French was coolly told no data could be procured, so he was compelled to prosecute his inquiries in private quarters as best he could; consequently his report is confined to three provinces—those of Catalonia, Valencia and Andalusia. The principal industry of the first-named province is the cotton manufacture, employing some 110,000 men, women and children; while from 15,000 to 18,000 hands are engaged in flax, silk and wool factories, in which weavers and spinners earn upon an average from \$3 to \$4 a week.

Barcelona is the chief seat of these trades, but there is a growing tendency to carry them away into the interior of the province for the sake of convenient water power, a tendency which the striking propensities of the Barcelonense make stronger every day. The operatives of that city live in single rooms in "barracks" built by speculators for the purpose; but in the villages the artisans often occupy small houses; but in all cases their domiciles are poorly and scantily furnished.

In Valencia it is the rule to work from sunrise to sunset, with a half hour's breakfast and a two hours' dinner-time. The following is the scale of weekly earnings in

the different handicrafts—we quote those only of the first-class workmen—masons, carpenters, smiths, saddlers, tailors, and cigar makers, about \$4; shoemakers, a little less (women \$1.25); hatters, \$5.25; fanmakers, \$6.25 (women a little less than \$2). Silk weavers can barely earn \$2.50 a week; and seamstresses working at their own homes make from \$1.25 to double that amount. Luckily they are not expensive feeders, their two meals of breakfast and dinner being composed—the first of dried cod or tunny fish, bread, capsicums, fruit, and red wine; and the last of a thick soup of rice, beans, parsnips, and olives. This fare is meager enough, but sumptuous compared with the *gaspacho*—a cold soup of slices of cucumber and bread in vinegar and water—that forms the principal support of the Andalusian laboring classes.

The lower order of working men are described as lazy, excitable, proud, and independent. It is perhaps creditable to them that they can be independent upon less than \$2.25 a week; but the better paid artisans, who earn from \$2.75 to \$6.25, according to their ability, are more immoral and more irregular in their habits. Their dwellings are small, poor, and uncomfortable; three or four families usually inhabit the same house; contracts between tenant and landlord are made for a period of two or three years, but the agreement is not worth much, as workmen leave their service at a moment's notice, and of course have often to leave their lodging at the same time.

In Portugal there is a pretense of registering statistics respecting the industries of the country, but these records are made by the parish *regedores*, who does the business gratuitously, and generally contents himself with making a sufficient number of random notes to satisfy official formality. According to the Portuguese authorities wages vary from month to month in every town and in every trade, ranging from twenty cents to \$1.30 a day; unofficial information places the maximum at 87½ cents a day. Artisans are, as a rule, badly lodged.

Trades' unions are unknown, and strikes of rare occurrence. If the workmen are not very highly paid, they earn enough for their wants, which are few, the Portuguese being a quiet, tractable, sober fellow, who works six days a week, and knows no such saint as St. Monday; nevertheless, it must be owned that, quiet and peaceable as he usually is, when there is no work to be got he is sometimes roused into something very like rebellion.

It would be strange indeed to find industry in any sort in favor of a land whose political leaders pander to brigandage, if they do not share its spoils. The poet, with the license allowed his craft, may extol

"The Isles of Greece, the Isles of Greece!
Where burning Sappho loved and sung;
Where grew the arts of war and peace;
Where Delos rose, and Phœbus sprung;

but the mountains that still look upon Marathon, if mountains have feelings, must look down with contempt on the degenerate race that make the once proud name of Greek a byword and reproach. In Greece the natural resources of the country are left undeveloped, manufactories are few and far between, and commercial activity scarcely exists.

Those Greeks who possess energy and intelligence betake themselves to other countries, and seldom return to their own, even when success has given them all the wealth they desire. Capital, consequently, is scarce in Greece, labor languishes accordingly, and the artisan class is very limited in numbers, and is never taken into account by native statisticians.

What artisans there are live in one or two-roomed earthen-floored houses, with doors opening upon dirty little courts, and windows for the most part destitute of glass, cleanliness and comfort being unconsidered trifles. The rents of these places range between \$1.75 a month and double that sum, whole families occupying a single room. The highest wages earned are earned by house decorators, who make about \$6 a week; carpenters and masons get \$5.25; barbers, \$4.25; weavers and watchmakers, a little over \$3; blacksmiths, a little over \$2.50; tailors, \$2.15; bakers, \$1.63. These are the maximum rates; but in all trades payment is reckoned by the day, and as thanks to the numerous holidays kept by the Greek Church, there are only two hundred and sixty-five working days in the year, considerable reduction must be made in the earnings of the Greek artisan. Fortunately food is cheap, such meat as is to be had costing less than ten cents a pound, bread three cents, and the resined wine in which he delights but four cents per quart; a very small quantity of food suffices to sustain life in such a climate, and the want of warm clothing and fuel is rarely felt. As a rule, engagements between masters and men are not binding, both parties holding themselves free to break them without any warning. Apprentices are, however, bound to serve out their indentures, in some cases paying for their training, in others working without pay, and sometimes receiving a small wage; but in almost every case they are boarded and lodged by their masters, for whom they not unfrequently have to perform the duties of servants.—*Chambers' Journal*.

—The distance from Bombay to Calcutta by the present route is 1,470 miles. The journey occupies about 70 hours. The fares are: 1st class £14, 2d class, £7, and 3d class £2 13s. By means of this line a saving of three or four days in the journey between England and Calcutta has been effected. No greater time is now occupied in reaching Calcutta from London than it took twenty years ago to get from one end of India to the other.

—The Delaware & Raritan Canal and Camden & Amboy Railroad Company give notice that the United States tax retained on the payment of their coupons of August and September, 1870, will be paid over to parties entitled to the same on application at the company's office.

On Proposed Improvements for Common Roads.

BY PROFESSOR S. D. TILLMAN.

(Read before the American Association for the Advancement of Science, at the Troy meeting, 1870.)

If durability be the most essential quality in a good road, the ancient Romans excelled in the art of road making. Of the twelve famous highways leading into their capital, vestiges of which are still to be seen, the Appian Way was the oldest. Originally its length was 142 miles; at a later period, it was extended to 350. It consisted of large blocks of smooth stone, accurately fitted together for the use of carriages, and a foot pavement on each side two feet wide. A part of the Tiburtine road, near Tivola, still remains undisturbed, having been in use more than 2,000 years. One of the most remarkable roads of which we have any account, was that lead from Quito to Cuzco, built by the ancient Incas of Peru, 900 miles long and 75 feet wide. According to Prescott, the historian, "it was conducted over pathless sierras covered with snow; galleries were cut for leagues through living rocks; rivers were crossed by means of bridges suspended in the air; precipices were scaled by stairways hewn out of the natural bed; and ravines of hideous depth were filled up with solid masonry."

However much we may admire the massiveness and permanency of ancient roads, when estimated by the modern standard of utility, such structures are found not to meet the requirements of this practical age. Modern engineering has demonstrated that speed, certainty and safety are the three great requisites of intercommunication. An absolute and complete change in the manner of traveling has been wrought by the introduction of the railway and the locomotive. One has given us a perfectly-smooth and solid pathway of easy grade, its great economy being in its reduction to such narrow width as to sustain only two wheels, which are kept securely thereon by means of flanges; the other has provided a moving power ever ready and reliable, untiring in its energies and matchless in its speed. The change thus wrought in our own country, where the railway system is far more extensive than in any other, was more marked, because the ordinary roads had not been much improved, and were in a condition similar to those of England a hundred years before. The once famous turnpike extending from Albany to Buffalo, over 100 feet in width, had been covered throughout its middle section, more than once, with broken stone, which, by the action of rain and frost, disappeared beneath the rich soil. Only forty years have elapsed since numerous stage coaches were running over this turnpike, making, during summer and winter, an average speed of eight or ten miles an hour, while in the spring and fall it did not equal that of the passenger boats on the Erie Canal.

Previous to the introduction of the railway, numerous experiments were made for the purpose of improving the common highways, and more especially the pavement of cities and large towns. Of stone pavements, the cheapest and the most objectionable is the cobblestone; superior to this is the Belgian pavement, which consists of rough stone cubes, imbedded in sand. The most durable and costly, yet, in the end, cheapest stone pavement, consists of stone blocks, about three inches thick and twelve inches square, set on end, with their broadest faces in contact and resting on a bed of concrete, like that now on Broadway, in the city of New York. Professor Mahan, in his essay on "Road Making," states that asphaltic pavements—consisting of bitumen and sand—and wooden pavements have been extensively used in Europe, but seem not to have answered the desired purpose. The most popular pavement in this country at present is made of wooden blocks, resting on a wooden foundation covered with bitumen, and separated from each other by means of a thin partition of bitumen and gravel. The ease with which the horse travels on this pavement, and the almost entire absence of noise, are strong points in its favor. The question as to its durability on much-traveled thoroughfares has not yet been definitely settled. Roads made on the plans of Macadam and Telford are not used in the business streets of American cities, on account of the fine grit and dust resulting from the action of horse-shoes and wheel-tires. It is needless to say none of the plans alluded to fulfil all the conditions of a perfect pavement, since none of them embrace the admirable peculiarity of the railway, in providing for the wheel a perfectly smooth pathway. Obviously, the smooth, solid surface, on which great speed is attained by means of the locomotive, would on the common highway result in somewhat increased speed, with a great decrease in the power required to produce that speed; in other words, all loads could be transported more rapidly by employing not over one-third the number of horses now used to do the same work, and with far less wear and tear. To illustrate this point, let us take the most perfect pavement—that already alluded to on Broadway—where a pair of horses attached to an omnibus draws less than one-fourth the load drawn by a pair of horses attached to a street railway car. Each of the wheels of an omnibus, in passing from one stone, falls slightly, and raises as much by sudden contact with another; thus a series of concussions are made by each wheel, which jerk the horses, jolt the passengers, and jar the vehicle. The number of noisy concussions thus made by an omnibus in passing over one mile on the Broadway pavement, is about 63,000, and in one day's travel of thirty miles, is 1,890,000.

It may be asserted with truth that the concussions are not so great on wooden pavements, as is proved by the absence of noise. This result is owing to the fact that wood is more elastic than stone, and gives way slightly under pressure; yet, in this fact lies the proof that a loaded wagon can be drawn with less effort over a good stone pavement than over one of wood; which will be apparent, if we reflect that the wheel, by its great pressure on the wood, is constantly sinking slightly below the general surface, and thus constantly forming an impediment before it which must be overcome. When the wood is wet the sinking of the wheel is perceptibly increased. According to the experiments made by Sir

John Macneil, to determine the force of traction for one ton on level roads, it was found that on a gravel road the force is 147 lbs.; on a broken stone surface, laid on an old flint road, 65 lbs.; on a broken stone road, covering a rough stone pavement bottom, 46 lbs.; on a good stone pavement, 33 lbs. To this it may be added, that the force of a railway is 8 lbs.; in other words, that one horse will draw on a railway more than four can on a good stone pavement. Nicholas Wood, in his treatise on railways, estimates the force of traction for one ton on a smooth turnpike road at 73 lbs., and on railways at 8½ lbs.; that is to say, two horses will draw more on a railway than seventeen horses can on an English turnpike.

The important problem now presented, is to construct city pavements so as to embrace the essential features of the railway. Its successful solution depends on the following conditions:

1st. To form a solid and virtually smooth surface of an unyielding material, on which the carriage wheels may roll.

2d. To provide a foothold for horses in passing over such surface.

If the material used for this purpose is stone, in small blocks, we find by experience that, when laid with the utmost care, there is always a space left between these blocks, over which the wheel must roll, and in passing from a stone the wheel strikes the next with a blow proportionate to the load it sustains, the effect of which is to wear off the edge of the stone; and the wheel passing in an opposite direction wears off the opposite edge, so that the space between the stones is gradually widened, thereby increasing the force of the blow by the wheel; thus the stone in time becomes rounded on two sides, and in that form is hardly more efficient than cobble stone.

If the material employed were iron it might be cast in hollow blocks so as to interlock, and its face could be provided with a series of smooth raised surfaces, alternating with depressions or indentations; and the raised surfaces could be so arranged that the wheel would be constantly sustained on a true grade by rolling over one raised surface, which should touch the middle of the tire, or rolling over two raised surfaces which, either simultaneously, or alternately, would give a bearing to the wheel tire near its sides. The transverse depressions thus formed allow the toe-cork, or fore part of a horse shoe, to sink below the raised or grade surface, and by means of such surfaces the horse would find a sufficient bearing against which to exert the leverage of his foot.

Cast iron blocks thus made might cover the whole surface of a street; but as the cost of such a pavement would be a serious obstacle to its general adoption and use, the more feasible plan is to provide an iron pathway or tramway for each wheel of the vehicle, and fill in the spaces between such iron pathways with either stone, wood, or asphaltic composition, thus providing a pathway for the horse. A pair of iron paths, each about one foot wide, and placed four feet and a third apart, would provide a tramway suitable for vehicles of various widths, embracing the pleasure carriage, cart, lumber-wagon and omnibus, and a pathway for a pair of horses between such tracks. The tramway could be made of hollow cast iron blocks, each about a foot long, with a projection on one end and a recess on the other, so that when brought together and interlocked, the pressure on the edge of one block would be transferred to the centre of the next. Such blocks could be laid directly on pure sand, or be filled in from beneath with wood and laid on a perfectly solid and smooth foundation. The tramway could also be constructed of longer wrought iron or cast iron plates, having longitudinal ribs or webs underneath to strengthen them; each resting securely, by means of spikes, on one half of the top of a wooden post set in the ground, and reaching below the action of the frost. This plan would give a permanent pathway for the wheel, independent of that for the horse; and also would be unaffected by any changes which the surrounding earth might undergo by the action of water or frost. The face of such tramways could be composed alternating smooth elevations and depressions, of a series of narrow ribs running longitudinally, or of a smooth surface, having on it one or more lines of elevations and depressions, so arranged as to provide a foothold for horses, and, when placed on the edges of the tramway, to allow wheels to pass obliquely over it without sliding.

A single pair of iron wheel-paths of this description placed in the middle of a street not much used, would accommodate all carriages which, in this case, would have to turn off from the track in passing each other. In a more busy street two pair of tramways would accommodate carriages going in opposite directions. In still more crowded streets four pair of tramways could be laid down—two for loaded teams moving slowly in opposite directions, and two for carriages moving more rapidly in opposite directions, and on great central thoroughfares, like Broadway in the city of New York, my plan is to lay down longitudinal iron paths, from six to nine inches in width, alternating with stone, wood or asphaltic footway for a single horse about two feet in width, so as to fill up the whole width of the street with alternate wheel-ways and horse-ways. It need hardly be added that such tramways would make the steam carriage practicable.

Such, briefly stated, are the main features of the iron tramway system, which, if introduced on common roads, would add to the comforts of the pleasure carriage, save the wear of vehicles, make every horse four times more efficient, and, in fine, work a revolution as radical and beneficial as that which followed the introduction of the railway.

—The grants by Congress to the following named railroads in Arkansas, foot up as follows: Memphis & Little Rock Railroad, 365,589 acres of the public lands; the Cairo & Fulton railroad, 935,621 acres; Iron Mountain Railroad, \$866,000, and 1,400,000 acres besides; Little Rock & Fort Smith Railroad, 453,771 acres.

List of Land-Grant Railroads.

The Toledo *Blade* has obtained from the General Land Office at Washington the following list of railroad companies to which public lands have been granted by Congress. Under the law approved July 15th, 1870, soldiers and sailors who served not less than ninety days in the army and navy of the United States, during the rebellion, are entitled to homesteads of 160 acres on the alternate reserved sections of land on the line of any of these roads:

MICHIGAN.

Port Huron & Milwaukee; Detroit & Milwaukee; Jackson, Lansing & Saginaw; Flint & Pere Marquette; Grand Rapids & Indiana; Marquette & Ontonagon.

IOWA.

Burlington & Missouri River; Chicago, Rock Island & Pacific; Cedar Rapids & Missouri River; Iowa Falls & Sioux City; McGregor & Missouri River; St. Paul & Sioux City; Sioux City & Pacific.

WISCONSIN.

West Wisconsin; St. Croix & Lake Superior, and Branch to Bayfield; Chicago & Northwestern; Portage, Winnebago & Superior.

MINNESOTA.

St. Paul & Pacific; Branch of St. Paul & Pacific; Minnesota Central; Winona & St. Peter; St. Paul & Sioux City; Lake Superior & Mississippi; Minnesota Southern; Hastings & Dakota.

CALIFORNIA.

Central Pacific; Western Pacific; California & Oregon Southern Pacific; Stockton & Copperopolis.

OREGON.

Oregon & California.

COLORADO TERRITORY.

Kansas Pacific; Denver Pacific.

MISSOURI.

Hannibal & St. Joseph; Atlantic & Pacific; Cairo & Fulton; St. Louis & Iron Mountain.

ARKANSAS.

Cairo & Fulton; Memphis & Little Rock; Little Rock & Fort Smith.

KANSAS.

Kansas Pacific; St. Joseph & Denver City; Kansas & Neosho Valley; Southern Branch of Union Pacific.

NEVADA.

Central Pacific.

Counter Pressure for Stopping Trains.

The *American Railway Times* publishes the following letter from William Naylor, of London, on the chatelier system of counter pressure as a substitute for brakes:

Continuing the subject, I will, if you will allow me, state briefly the results of some actual experiments in stopping railway trains, which I think must be interesting to your readers; and the high respectability of the experimenters will, I think, be a sufficient guarantee for their correctness. At the Birmingham meeting of the Institution of Mechanical Engineers, in January last, Mr. Bramwell gave the results of three experiments he had made on a portion of the London & Southwestern Railway. The weight of the entire train, engine and tender included, is given as 160 tons. The weight of the engine, 31½ tons upon six wheels, four wheels coupled; upon these there were 21¼ tons.

The dimensions are given as 17 in. cylinders, 22 in. stroke, and the driving wheels, 6 ft. 6 in. diameter; the tender, two four-wheel brake vans, and one carriage weighing 36½ tons, had brakes for applying to the wheels. The line was straight and level, and in each case the speed was 40 miles an hour when they commenced to stop them. Mr. Bramwell stated that in the first experiment the steam was simply shut off, and neither brakes nor counter-pressure were applied, but the speed was left to die out until the train came to a stand of its own accord, which it did in a distance of 5,376 ft. In the second experiment the brakes alone were applied for stopping the train without the counter-pressure steam, which they did in a distance of 1,080 feet.

In the third experiment, the counter-pressure was used alone without the brakes and brought the train to a stand in a distance of 2,712 ft., and consequently required a distance of 1,632 ft. more space to stop in than the brakes. Putting the second and third experiments into percentages for comparison, it appears the retarding powers were 15½ per cent in favor of and superiority of the brakes over the engine counter-pressure; in other words, the engine had only 40 per cent. of the retarding power of the brakes, and this, too, as Mr. Bramwell has shown by a diagram taken from one of the cylinders when working counter-pressure at 40 miles an hour he found 150 lb. per square in the cylinder or 30 lb. over the working pressure of the boiler. When more retarding power than either or both put together is desirable, not only to prevent collisions but for the economical working of trains stopping at stations near together, I don't think railway companies will find it to their advantage to do away with brakes and rely solely on the use of counter-pressure in the engine. In the face of these interesting experiments some advocates of the latter system suggest the constant use of the engine reversed and not to use the brakes, but still have the brakes on for putting up a train quickly to avoid collision. If these brakes are only to be brought into use on these special occasions, is it not probable that the screws will get set fast, and so when they are required for putting up to avoid collisions they will be found to be useless? Is it not better to keep the brakes in constant use and good condition, especially seeing that they are 150 per cent. more effective than the retarding power of the engine? and have the reversing of the engine in cases of emergency? This does not get out of order, because the fact of its hauling the train insures its condition for doing its part in stopping a train as an additional force whenever it may be required; and if

even it should be found that in reversing the engine it is liable to break cylinders, steam pipes, axle boxes, and frames, it is much better to break all those than to have a serious accident. Then, as to the skidding of the wheels, that, of course, is very objectionable, and it arises chiefly from an insufficient number of brakes being in use. Use a greater number with a train, with a less amount of force on each and you do away with skidding. The other experiments I wish to refer to were conducted by Colonel Yolland on the East Lancashire Railway in the year 1858. His train consisted of an engine and its tender and seven carriages, with a brake to each, one portion with Newall's and the other Fay's system of continuous brakes. The entire weight, including the engine, is given as 101 tons, of which 72 tons were supplied with brakes.

One experiment was, with this train, traveling at 50 miles an hour on a level line, a signal to stop was given by firing a pistol, and the train was brought to a stand in 588 ft.

Another was with the same train traveling at 53 miles an hour down 1 in 120, stopped in 7.5 ft. In dealing with the first of these two experiments, we find that a body must fall through a space of 84 ft. to produce a velocity of 50 miles an hour. Then $588 \div 84 = 7$, or a slope of 1 in 7; and that one-fourth the square root of the perpendicular gives the time of the body falling, and this multiplied by the slope (in this case 7) = 16.03 seconds of time to stop the train. Here the coefficient was one-seventh of the entire strain, including the engine, which had not a brake; but possibly it was reversed, for the report which I have seen does not state whether it was so or not. No doubt every man was at his post to get his brake on as soon as possible after the signal was given, but if the steam was shut off and the brakes applied in two seconds, there must be a coefficient of one-fifth throughout the train to stop it.

It appears M. Le Chatelier has quite recently introduced a system of injecting steam into the exhaust pipes of locomotive engines when the steam is shut off, but not reversed. This I consider a most valuable improvement, and, I think might be applied with advantage to all locomotive engines. I know, from practical experience, that when an engine without steam is drawn by another for a distance of six miles the cylinders of the dead engine get very dry and very hot, and in a distance of twelve miles the pistons have been found to grind the cylinders and produce fine iron dust. Then, if a train has to descend an incline of 1 in 70, or 1 in 75, for eight or ten miles with the steam shut off, as on portions of the Lancaster & Carlisle, Caledonian & South British, there must be mischief in the cylinders, except the brakes are put on a little in excess, so as to allow a little steam to be applied occasionally into the cylinders. Locomotive engines with 54 inch stroke, having the usual amount of lead that I found best in practice, will, when out of gear, open the steam ports in either direction to the extent of the lead of the slide, and, under these conditions, would, when out of gear, cut off at 4 inches of the stroke of the piston, and exhaust 13 inches out of the 24 inches.

Cut off at 8 inches will exhaust at 16.75.

Cut off at 12 inches will exhaust at 18.

Cut off at 12 inches will exhaust at 18.75.

Cut off at 16.8 inches full gear will exhaust at 21.6.

When an engine is running with the steam shut off, the usual practice is to put the valves into gear in the direction the engine is traveling. But with M. Le Chatelier's mode of injecting steam into the blast pipe when it is shut off from the cylinders, if the engine is put out of gear and no steam admitted from the boiler, with the first move of the piston down the cylinder a partial vacuum commences after the piston, and when it has moved thirteen out of twenty-four inches, the communication between the advancing side of the piston, and the atmosphere through the exhaust passage and the blast pipe is closed. At the same time a communication is opened between the blast pipe and the cylinder behind the piston, the steam that is being injected into the blast pipe rushes into the cylinder behind the piston, fills up the voids, and follows it for the remaining 11 inches of its stroke while that vapor which is escaping from before the advancing piston into the atmosphere, being stopped by the changed position of the valve, when the piston has traveled 13 inches, forces the slide valve from its facing, and by that means enters the steam chest. This gives the lubricating effect of moist steam through every part of valve, chest and cylinders, and adds some little to retard the motion of the train. If it should be necessary for the engine to be put into full gear unrevolved, the pistons will pump steam into the boiler and that will not interfere with the working of the injectors. And when it is necessary to put the engine into fore gear there will not be any water to come out of the cylinders as if from a case of excessive priming. In my last letter I stated what I believed to be the case in the cylinder of an engine with 24 in. stroke making three revolutions per second. I took that speed because it had been indirectly referred to in the "paper," but in such a way that it might be inferred that that was a useful speed down inclines. Indeed I had heard some gentlemen give as their opinion that with the Chatelier water counter-pressure and without brakes, very heavy trains could be brought down long steep inclines at 26 miles an hour much safer than at 10 miles an hour when the speed was controlled by brake blocks acting on the wheels.

If the speed controlled by the counter-pressure engine is 13 miles an hour instead of 26, then the conditions are greatly changed; the piston would only meet the steam in the cylinder at half speed, and the valve would take twice the time to give the same opening to admit the steam meeting the piston.

I have only one more practical observation to make on this important subject.

We know that rails change very much in their state of adhesion, and that we sometimes see an engine and train moving in one direction and the driving wheels of the engine revolving in the opposite direction. The fact

of an engine slipping at all, either front way or back way, is because there is something on the rails that prevents the perfect contact between the tire and the rail. This foreign matter accumulates most under a damp moist atmosphere. If we stand by an engine starting a heavy train from a station, and it commences slipping, we see a quantity of fine dust come out from between the tire and the rail.

Supposing an engine working as counter pressure down a steep incline comes upon rails in this condition, and the engine commences to slip backwards, but gravity impels it and its train onwards, every revolution that the wheels make backward they brush this dust up before them, making bad worse every moment, for it accumulates, and as long as it is present to prevent the tire coming in direct contact with the rail, so long must its retarding powers be insufficient. Sand may be applied before the wheels; but so long as the engine continues to slip rapidly backward, the sand is brushed up before the wheels and they are prevented from rolling upon it. This is the only way that I can account for certain accidents taking place in different parts of England and Wales that I have inquired into during the last eight or ten years.

The Uses of the Bessemer Metal.

In this country but little use has been made of the Bessemer metal, save for the manufacture of rails, while in Europe it has been successfully applied to many other purposes, among which we may mention boiler making, and the construction of many running parts of machinery. Evidently, as Lieutenant Dutton, declares, it has generally replaced wrought iron and not steel. The use of the misnomer steel has doubtless been the reason that this metal has not been applied to many purposes for which it appears to be better adapted than either cast iron, wrought iron, or steel. Cast iron and crucible steel, though they are harder than wrought iron, possess less tenacity; hence, for constructions intended to resist jars or strains, neither of these metals have of late years found any extended use. The only other metal formerly known possessed of sufficient tenacity for such purposes was wrought iron, which, in the course of time, has gained for itself so high a reputation that much prejudice has to be overcome before people will use anything else. In fact, iron-men are noted for their conservatism, and we readily admit that they ought to be conservative, when we consider the vast interests committed to their charge, often involving numerous human lives, as well as large amounts of money.

By the pneumatic or Bessemer process it is doubtless possible to make a metal resembling steel so closely that for many purposes it could be substituted for it. But in practice we find that what is actually made differs very widely from steel, and comes into competition rather with wrought iron. Let us keep this point fully in view, while we compare the relative merits of wrought iron and Bessemer metal. Everybody knows that it is impossible to handle very large masses of iron at once in a puddling furnace; hence, if we want a heavy piece of wrought iron it is necessary to weld together two or more blooms, in order to get it. It is also notorious that blooms are too likely to contain slag and other impurities, to be directly used in the manufacture of wrought iron articles. They must first be subjected to the process of hammering, drawing out, and welding.

However carefully the process of welding is conducted, there is always a possibility of leaving the welds imperfect, and hence the product, though externally perfect, is subject to flaws in the interior, which render it liable to fracture under strains which it ought to resist with ease. Bessemer metal, however, can be cast in ingots of five tons each, free from slag, and capable of being used directly for the manufacture of heavy articles. In this case, instead of flaws from imperfect welding, such as occur in wrought iron, we are liable to find defects in the form of bubbles. Practically, it has been found that bubbles are much more frequent close to the periphery of the ingot than nearer the center, so that the internal appearance of a Bessemer ingot furnishes us with a correct idea of its internal condition. It is, moreover, asserted that when bubbles occur in the interior they are free from rust, and present clean metallic surfaces, which weld together perfectly when the ingot comes to be drawn out. A correspondent of the *Machines Constructeur* says that he has seen Bessemer metal used with great advantage for making the piston-rods of steam hammers which were used for hammering steel. Wrought iron pistons and piston rods of the same dimensions were used up in a short time, by the change of the iron from a fibrous to a granular structure, in consequence of the repeated concussions to which they were subjected. Bessemer metal has also been used for locomotive axles with excellent results. Its use for this purpose, as well as for boiler plates, is continually increasing in Europe, though we have not yet heard of its application to either purpose in this country. The fact that it resists the oxydizing effects of a flame much better than wrought iron is a strong argument for its use in boilers. It is only about thirteen years since the first introduction of Bessemer metal, and though its adoption for rail-making has been contested, step by step, until it proved itself far superior to other iron, it is now almost universally commended for that purpose.

It is scarcely to be expected, however, that because its merits for rail-making have been recognized, its other uses will meet with no opposition. Boiler-makers, for example, who have been all their lives accustomed to the employment of wrought iron, will not discontinue to use it at once though in the long run a superior material is certain of adoption. A large number of the boiler explosions, of which we hear so often, are doubtless due to the partial destruction of the iron by oxydation, in boilers which were originally equal to the task imposed upon them. This fact was fully proved in England, by evidence recently given before the committee appointed by Parliament to inquire into the cause of the alarming number of boiler explosions occurring annually in that country, and to suggest remedies. The sul-

phur contained in the soft coal, which is used almost universally in England, may cause the destruction of the iron to take place more rapidly there than it would in this country, where so much anthracite and wood are used. Still, this destruction is, in a great measure, due to the oxydizing effects of the flame, which Bessemer metal resists much better than wrought iron. So that the conclusions of the English committee are almost equally applicable to this country. This in connection with its greater tenacity, would seem to recommend especially the use of Bessemer metal for boilers, and will doubtless lead, before long, to its experimental adoption for that purpose in this country.—*Engineering and Mining Journal*.

Flour and Grain Train of Buffalo.

The eastward movement of flour and grain from the West, through Buffalo, from January 1st to October 1st, this year, as compared with the corresponding period last year shows a decrease of 38,487 barrels of flour, and a decrease of 2,109,733 bushels of grain, estimating flour as wheat.

The following statement shows the receipts of flour and grain at Buffalo by lake and Grand Trunk Railway for the month of September; also from January 1st to October 1st in the years indicated:

FOR THE MONTH OF SEPTEMBER.			
	Flour, bbls.	Grain, bu.	Grain, incl'g Flour, bu.
1870.....	199,717	5,342,474	6,236,989
1869.....	169,891	6,777,195	6,891,657
1868.....	277,223	9,928,001	11,814,166
1867.....	288,269	9,444,583	10,306,333
1866.....	189,953	6,324,000	7,173,765
1865.....	229,384	7,564,343	7,683,763
1864.....	233,349	5,861,856	7,028,566
1863.....	240,055	5,929,448	7,126,733
1862.....	246,810	9,237,450	10,971,510
1861.....	327,753	8,963,781	10,952,546
1860.....	189,943	6,269,594	7,158,839

FROM JANUARY 1 TO OCTOBER 1 IN SAME YEARS.			
	Flour, bbls.	Grain, bu.	Grain, incl'g Flour, bu.
1870.....	967,455	25,015,963	29,583,243
1869.....	945,943	27,063,366	31,692,976
1868.....	859,796	30,432,390	34,322,390
1867.....	717,506	25,484,800	29,076,440
1866.....	705,608	26,723,669	40,617,709
1865.....	1,186,219	27,711,690	34,702,150
1864.....	1,461,116	30,167,251	34,477,861
1863.....	1,537,728	35,377,708	45,571,948
1862.....	1,835,736	40,809,540	49,968,770
1861.....	1,185,404	32,414,139	38,341,159
1860.....	713,544	27,347,776	28,915,396

RAILWAY MOVEMENT.

The following shows the receipts of flour and grain by the Lake Shore Railway for the month of September, and from January 1st to October 1st, 1870:

RECEIPTS.		
	For Month.	From Jan. 1 to Oct. 1.
Flour, bbls.....	126,315	886,640
Wheat, bu.....	123,000	1,121,550
Corn, bu.....	281,800	3,306,900
Oats, bu.....	540,000	1,451,500
Barley, bu.....	6,300	60,340
Rye, bu.....	45,240	105,100
Total, grain.....	1,006,300	6,064,190

EXPORTS.

The following shows the exports by rail for the months of August and September, including city shipments and through shipments by the Lake Shore Railway:

	September.	August.
Wheat, bu.....	255,337	518,162
Corn.....	602,463	519,673
Oats.....	612,794	859,683
Barley.....	22,597	6,640
Rye.....	46,000	86,828
Total.....	1,569,179	1,990,986

CANAL EXPORTS.

The following exhibit shows the amounts of flour and grain shipped from Buffalo by canal from the opening of navigation to Oct. 1st, for the last four years:

	1867.	1868.	1869.	1870.
Flour, bbls.....	1,069	3,134	35,094	45,678
Wheat, bu.....	3,396,692	4,770,306	11,470,469	9,912,061
Corn, bu.....	11,136,063	12,802,061	6,429,974	4,652,398
Oats, bu.....	4,341,556	6,192,183	2,397,055	3,868,770
Barley, bu.....	561,887	31,361	440,986	440,986
Rye, bu.....	385,641	199,381	16,535	184,493
Total, grain.....	19,825,138	24,296,481	20,137,628	19,009,608

CANAL TOLLS.

The annexed statement shows the aggregate receipts of Canal Tolls at Buffalo from the opening of the Canal, May 1st to October 1st from 1860 to 1866, inclusive; May 6th to October 1st, 1867; May 4th to October 1st, 1868 and May 10th to October 1st in 1869 and 1870:

1870.....	\$ 763,237 75
1869.....	1,330,044 49
1868.....	1,428,536 12
1867.....	1,334,924 34
1866.....	1,591,703 97
1865.....	1,297,332 78
1864.....	1,636,918 31
1863.....	2,011,765 38
1862.....	2,357,681 61
1861.....	1,302,376 17
1860.....	84,680 02

NUMBER OF BOATS CLEARED.

1870.....	4,780
1869.....	5,690
1868.....	5,479
1867.....	4,909
1866.....	5,963
1865.....	4,725
1864.....	5,873

Buffalo Commercial Advertiser.

—Judge Ingraham of New York on the 27th inst. dismissed two appeals from Judge Balcom's decisions on minor points in the suit of Joseph H. Ramsay vs. the Erie Railway Company, and reversed the decision on the third from Judge Barnard's order requiring the suit to be tried in New York instead of Broome county, where it originally began.

Boiler Explosions.

Perhaps the most difficult code of laws to enact for the inhabitants of a free country are those whose object is to compel people to take care of their own lives and properties. It is impossible, for example, in a country like Great Britain to enact a statute against extravagance, and where a man comes in for a fortune a portion of his prerogative as a citizen lies in the fact that he may squander his property in such a manner as best pleases him. Were this principle confined alone to money matters, or any matters apart from danger to human life, all might be well, but it is not so confined, and as the law stands at present, an employer of labor in many departments of industry may, by either his carelessness, his parsimony, or his ignorance, endanger the lives and limbs of his employees without incurring much risk of being called to account in the event of a disaster.

For several years after the introduction of steam as a prime mover it was generally thought, even by clever professional men, that there was something occult, something mysterious in a boiler explosion. Papers were read, pamphlets and books written and published, each and all on this theme, and originating for discussion sundry theories more or less elaborate as to the causes of these explosions. Matters of late years, however, are gradually assuming another aspect. The possibility of so simple a supposition as that boiler explosions in nine cases out of ten, were easily preventable begins to receive attention, and the more the subject is investigated the more obvious becomes the plain fact that the inherent causes of these explosions are not to be found in peculiar chemical combinations, spheroidal heat phenomena, &c., but in the placing of a piece of wagon wheel or a bag full of bricks on the safety-valve lever, or letting the crowns of the firebox become red hot, or having boilers "cobbled"—no other word will apply—by any jobber who could knock up a rivet or handle a caulking chisel. Many attempts have been made by government to remedy this state of things without avail. The great obstacle to legislation, or one of the greatest, consists in the fact that legislation and responsibility in matters of this kind always go together. If government step into the province of the professional engineer it must assume the responsibilities of the profession, and to do so with safety or efficiency it must obtain the engineer's knowledge and experience. Again, another difficulty in the matter lies in the fact that engineering of all professions admits of no fixed rules; it is impossible to draw up a set of rules that will apply more than partially to this question. For example, it is impossible to prescribe by law the pattern of donkey pump to be used to feed the boiler, and it is a matter of difficulty to provide by law that boilers shall never get short of water, be subjected to over pressure, or be repaired by incompetent men. Any measures to be adopted in the way of legislation on this subject of explosions must be based on the rules of the existing boiler insurance companies, or consist in the severity of the penalties to be incurred by those to whom responsibility would attach for proved carelessness. There certainly is one point—we will say two—in which government not alone can but ought to interfere; the one is the question of responsibility of master versus man. In most cases this responsibility attaches exclusively to the former, but not always; several examples will be found where it attaches to both parties—attaching to the master in the careless employment of incompetent men to work their boilers, and attaching to the men who undertake duties for which they are not duly qualified.

The second point calling long and loudly for the change in existing laws is the manner of inquiry into what may be termed scientific disasters, such as boiler explosions. We have no doubt that coroners and coroners' juries honestly try to investigate such things to the best of their abilities, but in these matters ignorance is not bliss, and it is therefore folly not to seek out wisdom. In such matters as come within the Board of Trade rules scientific evidence under certain conditions may, we believe, be called, but a coroner has no such power. Government will generally send an engineer to the scene of an explosion and receive his evidence, but this plan does not go far enough; there should in such inquiries be a professional assessor on the bench to assist the coroner, and who should have full power to ask questions; these courts, too, should have power to call more than one scientific witness. Nothing gives professional engineers more disgust than the perusal of the reports of coroners' inquests as at present conducted in dealing with questions of science. The questions that should be asked are not asked, and questions are put that are very foreign to the real point at issue.

That, however difficult the task of legislation on this subject of boiler explosions may be, it yet is one that Government can no longer neglect is patent to all observers. The glaring instances of parsimony, of incompetence, and of reckless carelessness that are reported over and over again show the necessity for some amendment in the law. Take the explosion at Leicester the other day, for example. In that case nothing could exceed the either gross ignorance, or worse still, the criminal carelessness displayed by both those who mounted and those who worked the boiler. The evidence of an engineer proved, first, that the safety valve was too small; second, that the ratio of the lever did not agree with the area of the valve, so that in the first case the valve, even if properly loaded, could not efficiently relieve the boiler if a heavy fire were on and the engine standing, or in the second case the pressure in the boiler would be much in excess of that shown by the spring balance on the lever when the valve was blowing off. There is no more difficulty in compelling boiler-makers to take out licences to pursue their trade than there is to make physicians or surgeons or solicitors have licenses. Master mariners and pilots must have certificates of competency, and in event of miscarriage in their several callings they are liable to have their certificates suspended. There is no reason why this system, suitably modified, should not be applied to the makers, repairers, and users of steam boilers. We see patents again and again secured for im-

proved safety valves, for improvements in feeding water, and for sundry other contrivances to diminish the chances of explosion; but, *qui bono?* so long as the commonest and most obvious provisions against these calamities are persistently neglected. We have had letters from correspondents proposing schemes for improved safety valves, and asking us questions as to the reason why boilers should ever explode if provided with proper ones. Is it not, however, folly to expect that elaborate and costly contrivances will be employed when the plain button valve and steelyard are not used as they should be?

Another important point should receive careful attention from the commission on boiler explosions (one, by the way, which we fervently hope will be reprinted next session of Parliament), that of stays. Only too frequently is this part of a boiler maker's work most shamefully "scamped," and scamped more and more in proportion as the proposed working pressure is lowered; in fact, as a rule high pressure boilers are much more carefully made and worked than are low pressure ones, for the simple reason that pressures of 100lb. or 140lb. per inch enforce attention in a manner that will take no denial. We have heard of a cylindrical flat-ended boiler of considerable size (some 40ft. diameter) being worked which had not a single longitudinal stay in it. So bad a boiler, indeed, was it that a practical boiler-maker, called in to examine it with a view to repairs, instantly left the house and insisted on the fire being there and then withdrawn. The trick of fixing lumps of putty on the proper places to represent stay heads, in order to deceive insurance inspectors, is of common occurrence. Cases of Cornish boilers, whose flue tubes are destitute of angle iron strengthening rings, are by no means uncommon. We might fill columns were we to recite radical defects existing about boilers, working daily and hourly in the midst of crowded streets and workshops. Are they not written in the reports of boiler inspectors? Many of them, we fear, are beyond the reach of any but penal legislation, it being next to impossible to devise statutes of a preventive nature in the direct sense of the term. Still, although the subject is one attended with difficulty, yet we have gained much in stripping it of everything like scientific superstition, and in demonstrating the fact that steam boilers can be used with nearly perfect safety, so long as we take care to observe carefully the laws of nature and of common sense.—*Mechanics' Magazine*.

—The Chicago Tribune expresses itself as follows concerning the Master Mechanics' Association:

"So many national conventions assemble for the mere gratification of the vanity of opinionated, visionary, and shallow wind-bags, that it is a relief to read the proceedings of one convention of practical, skilful, sensible men, intent on perfecting our means of travel, lessening its cost, and saving human life. Such an one was that recently held in Philadelphia by the American Railway Master Mechanics' Association. The subjects discussed were specialties, and required for their proper comprehension, much mechanical knowledge not possessed by the general public. But the objects aimed at are of vital interest to the traveling public, which includes in America the whole people. The convention included 125 of the leading master mechanics, and machinists, and engineers of all the principal railroads in the country, many of them inventors, and men of large business capacity, and all of them men of special skill in their craft."

"The association is wholly free from every question of labor politics, and great good will result from its thoroughly practical and scientific discussions."

Restoring a Leaning Chimney.

During the last twelve months the large chimney at the Goole Alum and Smelting Co.'s works has been subsiding, owing to the intense heat from the furnaces, until it became about four feet out of the perpendicular. The chimney, which is a very handsome erection, is about 200 feet high, consequently in subsiding to such an extent it assumed a very dangerous aspect; and it was only a question of time as to when it would pass the centre of gravity and fall. Mr. J. Berger Spence determined a short time ago to bring the chimney back again to its original position, by cutting out a layer of bricks, about two-thirds of the way round, and about twenty feet from the base. When this layer of bricks had been taken out strong iron wedges were introduced, and a thin layer of bricks put in the place of the course of bricks extracted. When this had been accomplished, the wedges were then drawn out, and the stupendous structure came over with crushing weight on to the new made bed, assuming its original position. The plan which has been adopted, although very dangerous, has proved perfectly successful and the calculations have been made with such nicety that no one can detect a single flaw in the chimney.—*The Engineer*.

—The canal extension to Rock Island is now being surveyed by order of the Secretary of War. The survey is to include the main line from Hennepin to Rock Island, and the feeder from the Summit, at Sheffield, to Dixon. It will involve some six weeks of labor in the field, and is to be so thoroughly examined that the feasibility and cost of the work can be accurately estimated and reported.

Feed-Water Heaters and Popular Delusions Concerning Them.

The following is a letter written by James Baskerville, manager of the City Foundry, Limerick, to the *English Mechanic*:

The total heat of steam whose pressure is 40lb. per square inch above the atmosphere, or 55lb. total pressure is 1,200 degrees, counting from zero. The average temperature of river water the year round in these countries is, I believe, 40 deg.; therefore, if a steam boiler be supplied with water at 40 deg., and it is to be raised into steam of 55lb. total pressure, it must receive 1,160 deg. of heat from the fuel in the furnace; 25 per cent. or one fourth of 1,160 deg. is 290 deg., and any feed water-heater which professes to save 25 per cent. of the fuel used in generating 55lb. of steam from water at 40 deg., must send the water into the boiler at 200 deg. and no less. But that is impossible, and to profess to do it is false and absurd.

Water cannot be made hotter in an open vessel (that is to say, one which is in free communication with the atmosphere, whether covered or open) than 212 deg., but 212 deg. is only 18 $\frac{1}{4}$ per cent. of 1,160 deg. It appears, therefore, beyond the possibility of doubt or dispute, that 18 $\frac{1}{4}$ per cent. is the greatest saving which it is possible to effect by warming the feed-water by the waste steam, and that is the greatest theoretical saving which we can show even upon paper; but that is not, never was, and never will be, effected in practice, for even if the water is got up to 212 deg. in the "heater," it will lose several degrees on its way to the boiler through the pump and pipes, and from this cause alone the practical effect will always fall below the theoretical promise.

What then are we to say to those persons who persistently assert that their feed-water heaters save 25 per cent. of fuel? What can we say but that these statements originate either in utter ignorance of the natural laws which govern that operation, or else are put forth for the purpose of misleading the public and obtaining orders for their wares "by hook or by crook," and what can we say to those persons (if there be any such) who give testimonials that this utter impossibility is effected by the patent apparatus of Mr. A., B., or C., such testimonials possess no more value and contain no more of the element of truth than would one which testified that perpetual motion had been discovered, and was to be seen at work every day at Bilkenhead. But what can we say to Mr. S. Crompton of that place, who in the number of July 8 assures me, "whatever my figures may say to the contrary, that the 'inevitable 25 per cent.' saved in fuel, is not a delusion but a practical fact with feed-water heated to 212°." I have, says Mr. Crompton, "by careful and trustworthy experiments, proved the truth of these statements by weighing the coal used, week for week, doing the same amount of work with the engine in both experiments; that is to say, one week with the cold water, the other week with the water heated to 212° with the 'economiser,' in all cases the statements have been fully confirmed." What I say to Mr. Crompton is simply this, that he has bungled the matter somehow, and has succeeded in deceiving himself. It is more charitable to say that than to say he is trying to deceive others, but beyond all doubt he either has done the one, or is trying to do the other.

To show the unreliable nature of Mr. Crompton's statements and experiments, I shall examine his account of another impossibility which he relates circumstantially of his "economiser."

He says that with the waste steam from a nominal 14-horse engine he heats 6,000 gallons of water per day to 212°. Now what amount of heat is contained in the waste steam escaping from a 14-horse engine in a day? and what amount of heat is required to raise 6,000 gallons of water to 212° from 40°.

A gallon of water at the average temperature of 40° is to be raised to 212°, and it must therefore have 172° added to it.

A gallon of water in the state of 55lb. steam has 1,200° of heat in it, and in warming water to 212° it parts with 988° before it falls to 212° itself, these 988° are sufficient to raise 5.74 gallons from 40° to 212° (for if we divide 988 by 172—the difference between 40 and 212—we get 5.74 for a quotient) that is to say 5.74 gallons of water at 40° can be raised to 212° by the condensation of steam generated from one gallon of water under a pressure of 55lb. per square inch, and the result will be 6.74 gallons of water at 212°. This is the theoretical maximum, which in practice is never reached by a "long chalk."

A nominal 14-horse non-condensing engine, working without expansion, requires 14 cubic feet of water per hour for steam, but Mr. Crompton says his engine cuts off at half stroke, therefore it should not require more than 8 cubic feet per hour—steam when cut off at half stroke has its efficiency increased from 1 to 1.69. But I will say his engine uses 12 cubic feet of feed-water per hour or 75 gallons, or 751 gallons per day of ten hours, and that is the quantity of water in the state of steam which passes into the cylinder in that time; and as each gallon by its condensation is capable of raising 5.74 gallons from 40° to 212°, we arrive at a total of 4,305 gallons heated to 212° instead of 6,000, as Mr. Crompton asserts. But upon looking a little closer into the matter I find that a considerable deduction must be made from this 4,305 gallons, or else from the temperature it is presumed to be raised to, for all the heat which leaves the boiler on its way to the cylinder does not pass into the water-heater; about one-fifth of it at least is converted into work in the cylinder and disappears altogether, and not less than one-twentieth is dissipated by the exposed surfaces of the cylinder and pipes, &c.; thus no more than three-fourths of the heat which leaves the boiler on its way to the cylinder ever reaches the water-heater, and the 4,305 gallons as found above must be reduced to three-fourths of itself, or 3,229 gallons, to which we must add the 751 gallons resulting from the condensed steam, making altogether 3,979 gallons, and that is the greatest quantity of water which it is possible to raise from 40° to 212° in ten hours by the waste steam from a 14-horse engine, and even that requires that every particle of the

steam should be condensed in the heater and that not a breath of it should escape from the waste steam pipe (pipe G in Mr. Crompton's drawing), but this condition is impossible of fulfilment, for as long as pipe G is there a considerable quantity of steam will always escape from it.

This is rather less than two-thirds only of what the heater is said to be doing. Either the engine must be a great deal more powerful (30-h.p. at least), and use a great deal more steam than he supposes, or the quantity of water passing through the heater must be very much less, or, at a much lower temperature than he asserts.

Suppose his assertion is true that 6,000 gallons do really pass through the heater per day, then the temperature of that water can be higher than 70° (instead of 212°), and as Mr. Crompton feeds his boiler with this water, the saving of fuel by doing so is only 11 $\frac{1}{4}$ per cent., or not one-half of the "inevitable" 25, and this I am fully convinced, from my own observation and experience of feed-water heaters, is as much as nine out of every ten of them are doing in the ordinary way of work.

Every non-condensing engine should have a feed-water heater, it is wilful and prodigal waste to supply the boiler with cold water, when water at 160° or 170° can be so easily obtained for the purpose, and a saving of even 10 or 11 per cent. is not to be despised; but let no man expect much more, for if he does, he will surely be disappointed.

JAMES BASKERVILLE,
Manager, City Foundry, Limerick.

The Saint Gothard Railway.

The seven great passes of the Alps, considered with regard to the capabilities and exigencies of locomotive transit, are those of Mont Cenis, the Simplon, Semmering, Brenner, Luckmanier, Splügen, and St. Gothard. For fourteen years this last route has been urged upon capitalists as one likely to afford a remunerative return for capital invested; and but for the opposition of the German States, both north and south, the idea would long ago have been practically realised. The bringing into direct communication the Baltic and the Mediterranean, which would be effected by this line, could not fail to exercise a very material influence upon the commerce and trade of the towns situated along its course. The intercourse between France and Italy is already secured via Mont Cenis and the Simplon, but the St. Gothard pass would open up a northern outlet. In addition, the value becomes enhanced when it is borne in mind what a future development awaits the ports of Trieste and Brindisi in consequence of the opening of the Suez Canal. If not both of them, one at least must eventually become the emporium of most of the Oriental traffic that finds its way to European shores, and there is no imagination in predicting that its future may yet rival the palmiest days of Venetian splendor. There is one cloud in the distance, one shadow that arises to forbid that Italy should reap the full benefits of so magnificent a prospect. But fortunately for her the shadow may remain a shadow for many years, as the substance is in the hands of a people who place their faith in passive destiny instead of active and energetic volition. If the Ottomans could be roused to exertion, and made to see the vital necessity for constructing the Turkish system of railways, it might be then somewhat difficult for Trieste and Brindisi to compete with the superior advantages possessed by the Golden Horn. Judging from the past, the establishment of a railway to Constantinople is a contingency that is possible but remote, and until it is accomplished Brindisi may be regarded as certain to attain to a considerable maritime importance. Once in possession of the traffic, it would constitute the key of the Mediterranean, and would pour into northern Europe the rich productions of the East, through the passes of Mont Cenis, the Simplon, and St. Gothard. These different mountain routes are not necessarily competing or rival lines. That of Mont Cenis satisfies everything that can be required by the traffic of the midland provinces, as well as those situated south east of the Loire. It forms, in fact, the junction between the ocean coasts and the transalpine districts. So far as France is concerned, the St. Gothard route will provide access to Alsace, Lorraine, and the North, and will be the link necessary to perfect the direct communication from Dunkirk to Brindisi.

It is worth while to glance at the engineering features of the proposed undertaking. According to the original plan the summit level was reached at an altitude above the sea level of 4,577 ft., but after resurveying the line it was reduced to 3,776 ft., and the difficulties attending the higher level with respect to snow and avalanches appreciably diminished. The great work is, of course, the tunnel, which is eight and a half miles in length, for the construction of which £3,400,000 are allotted. As may be imagined, there is scarcely a bit of "level" or "straight" on the whole line, which, excluding the tunnel, is 400 miles long, and for which the sum of £4,000,000 is allowed. These figures give a result a little over the usual cost per mile of railways in Switzerland. Of the total sum necessary to construct the work, £3,120,000 have been already subscribed for by the various Swiss cantons, and the remainder is distributed among financiers and capitalists. It is estimated that the tunnel, the two termini of which are Göschenen and Airolo, will occupy nine years in excavating, basing the calculation upon the similar work now approaching termination at Mont Cenis. The line will be in direct communication with the Swiss system of railroads, and the fares will be per league, for first-class passengers, fourpence halfpenny; for second-class, threepence; and for third, twopence farthing. There is rather a singular addition made to the fares, where the gradients become very steep, of 50 per cent. above the minimum charge. For goods by fast train the tariff will be sixpence three-farthings per ton per mile, and, by slow, three-farthings for same weight and distance, with an extra charge, as in the case of passengers, along the heavy inclined parts of the road. In point of actual distance from Brindisi to Paris, the Simplon line has the advantage of the others,

the length being 1,150 miles, while the Mount Cenis route measures 1,175, and the St. Gothard 1,167 miles. Notwithstanding, however, the shorter length of the Simplon road, the time occupied is longer than that taken up by the Mount Cenis route, owing to the greater number of steep gradients and sharp curves. Were the St. Gothard line once constructed the total distance from Dunkirk to Brindisi would be reduced to 1,244 miles. But, while calculated to benefit the more northern traffic of France, the effect of this shortening of the present highway between these two ports is certainly not likely to be to the advantage of the commerce of Marseilles, the continental Liverpool. This has not been lost sight of by our neighbors, and, in order to preserve that monopoly of traffic which their southern emporium has so long enjoyed, several very extensive works have been carried on for some years. These include the improvement of the navigation of the Rhone and the Saone, and the completion of the canal joining the former rivers with the Rhine. It is doubtful whether the execution of these works, important as they are, will fulfil the anticipated object, but in any case they will afford the Mediterranean a better chance than it now has of competing with the Adriatic.—*The Engineer*.

Injuries to Passengers Getting on Trains.

In a recent appeal case of the Detroit & Milwaukee Railroad Company vs. Curtes and wife, Judge Paine of the Wisconsin Supreme Court decided as follows on the principal points:

But even if it (the train) had not come to a full stop, and the stops during which the plaintiffs attempted to get on board was one of those which resulted merely from checking the speed of the train, as the counsel urges, yet when passengers were told by those managing the train to go on board, they had a right to assume that the train was ready for their reception, and cannot be charged with negligence in following that direction, the train, where they attempted to enter, being actually still at the time. If the train was not ready for their reception, it was a clear act of negligence on the part of the servants of the company to tell them to go on board, as the proof shows was done in this case. And it makes no difference that they were told to go to the hind car, and that the plaintiffs, instead of doing so attempted to enter the third car from the rear. The conclusion which they had a right to draw from being told to go on board in any car was that the train was ready to receive them. And the direction to go to the hind car could only have been reasonably understood as informing them where they could most conveniently find seats. There was no occasion for them to infer that they were guilty of any negligence or exposing themselves to any danger if they entered another car. And if the plaintiff was guilty of no other negligence than that, and was injured by starting the cars suddenly and without notice, while so entering she ought to recover.

But there is one proposition, in the instructions given by the court, which I think cannot be sustained. It is found in the remarks immediately succeeding the further instruction asked by the plaintiffs, partly as an addition to that instruction, and partly in further enlarging upon the same idea. Without quoting them literally it is enough to say that they told the jury that if they believed from the evidence that if the company had had an agent, wearing its badge, whose special duty it was to warn passengers not to go on board till the cars stopped, and to inform them in what cars to enter, and to tell them that there was room for all, etc., and that such an agent would have prevented the injury, and that there was no such agent there, then the defendant was guilty of negligence, and liable in the action. I know of no law requiring this of railroad companies. And while they are justly held to a strict responsibility, and required to exercise the highest degree of care and diligence to provide for the safety of their passengers, yet I think no such application of this rule as that contained in the proposition of the court below, has ever been made, and that it would be unreasonable to make it. The extreme vigilance and care required of them relate usually to the proper construction and management of their cars and road. But the instruction of the court below would hold the company liable, although there was no negligence whatever in the management of its train, because it did not have a special agent to warn the plaintiff not to go on board till the cars had stopped, and to give her information about getting on board. This it was not bound to do. On the contrary it had a right to assume that the plaintiff, and all other persons traveling, possessed that ordinary intelligence and prudence necessary to enable them to take care of themselves, in view of the ordinary incidents of traveling upon railroads that are constructed with proper care and skill. Getting on and off the cars are among these incidents. To attempt to get on or off while the cars are in motion is an act of negligence. And to say that a railroad company is liable for not having a special agent to prevent passengers from injuring themselves by such acts, is to say that without any other negligence on its part, it is to be held liable for not having an agent to prevent passengers injuring themselves by their own want of ordinary care and prudence. There is no reason or authority for such a proposition.

—Within the last three weeks thirty new locomotives have arrived at the Jeffersonville Bridge Depot from the manufacturing in the East. They were built for various railroads in the South, and upon their arrival at the bridge were transferred to the Louisville & Nashville track and forwarded on.

—The earnings for the Central Pacific Railroad, for the first fifteen days of September, were \$425,335. The traffic and travel are so heavy that the full month will reach the enormous sum of nearly \$850,000, which would be the largest monthly earnings since the road was finished.

General Railroad News.

OLD AND NEW ROADS.

Grand Trunk Railway.

Much fault has at various times been found with this line of railway. But it is gratifying now to be able to say that, from almost every point of view, the affairs of the Grand Trunk are looking up. The road bed is gradually improving, and the new freight and passenger cars turned out by the Canada Rolling Stock Company are rapidly increasing the capacity of the road to accommodate promptly and efficiently the business of the country. The fast trains which commenced running this summer, appear to have added largely to the passenger traffic. The number of through passengers, in particular, has recently been quite large, a fact which manifests increased confidence in the Grand Trunk on the part of our neighbors across the lines. We are also glad to observe that the traffic returns show a marked increase of receipts. The following figures embrace the total receipts for the months of July and August, and the returns for the corresponding months of last year:

	Receipts 1869.	Receipts 1870.
July.....	\$57,120	\$70,967
August.....	547,693	574,380

The increase in receipts, as shown by these returns, is considerable; in July, the augmentation amounts to nearly \$45,000, and in August, to \$26,506. It is to be hoped this increased traffic will enable the company to make still further improvements in their road. Although there are evident signs of improvement, it is scarcely in the condition it should be to meet the requirements of the rapidly increasing business of the country. But from what we have seen this season, both in regard to the improvement of the road, and the increase of the traffic, we think there is reason to hope that in two or three years the Grand Trunk will be in a thoroughly efficient condition, with its financial difficulties surmounted. It is certainly not less the interest of the people of Canada, than of its stockholders, that these expectations should be realized.—*Canadian Monetary Times*.

Georgia Railroad.

This road, owned by the State of Georgia, extends from Augusta westward to Atlanta, 171 miles, with three branches measuring altogether 61 miles. A party of New York capitalists offer the State \$5,000,000 for the road, and a bill has been introduced into the Legislature providing for its sale.

The Buffalo Bridge.

Another link of the chain which binds the people of Canada and the United States—commercially—is being rapidly proceeded with. We refer to the great International Bridge, which is intended to span the Niagara River, and unite Buffalo and Fort Erie. Messrs. Gzowski & Co., who have the contract, are pushing forward the work with their usual energy, and considerable progress in laying the foundations of the abutments has already been made. Some of the stone used is brought all the way from the neighborhood of Georgetown, (between this city and Guelph) and it is reported that the iron super-structure is being made at Phoenixville, Pa. Sub-contracts both for masonry and wood work have been given—the former to a Mr. McCaul and the latter to Mr. Henry McFarland. Mr. Joseph Hobson is the resident engineer, and Mr. A. W. Schweigert is the chief agent, at Fort Erie, of the contractors.

When completed, this bridge will be a noble structure—not so extensive as the Victoria bridge at Montreal, but still one of the finest railway bridges on the continent. It must have a most beneficial effect upon the railway traffic of the Buffalo & Lake Huron section of the Grand Trunk, whose attractions to American passengers must increase from the day the bridge is opened. The city of Buffalo, which has taken a lively interest in the work, will also be benefited largely, for with so safe and easy a crossing between Fort Erie and that city, much passenger traffic will pass through Buffalo, which at present reaches the east by other routes. The bridge is expected to be finished before the close of 1871, and the high standing of Messrs. Gzowski & Co., affords the best guarantee that nothing will be left undone by these contractors to realize present expectations.

One result likely to flow from the progress which the International Bridge is making, is the early ripening of the long-talked-of project of uniting Windsor and Detroit, either by a bridge or a tunnel. When the Grand Trunk will soon be able to cross the Niagara River without stoppage at Fort Erie, the Great Western cannot long rest content to bear the detention in crossing the Detroit River, at Windsor, which now takes place. The expense which is incurred at present, not to speak of the vexation, is something formidable, and it is to be hoped the commencement of a tunnel below the Detroit

River will not be much longer delayed. We say a tunnel, because a bridge at that point would seriously interfere with the shipping of the lakes, and a tunnel is quite practicable, although it may be more costly.—*Canadian Monetary Times*.

Toledo, Wabash & Western.

George H. Burrows, the General Superintendent, has issued the following circular:

"The Toledo, Wabash & Western Railway Company, having recently extended its line of railway to the city of St. Louis, will commence running all its regular passenger trains through to that city, on the 4th of October next. The day trains will be equipped with new and elegant passenger coaches, and all night trains with the much celebrated and popular Pullman and Gates and Wagner lines of palace sleeping coaches, which for the greater convenience of passengers, will run between New York and St. Louis without change.

"This line constitutes the shortest possible route between Lake Erie and the Mississippi River, and is in excellent condition, thoroughly equipped, makes close and reliable connections, operates the most efficient through dispatch freight lines in the country and otherwise presents to the traveling public and shippers of freight, facilities and advantages of marked superiority."

Queen Anne's & Kent.

The new contractors on this branch of the Delaware Railroad across the "Eastern Shore" of Maryland, Messrs. Irwin & Sons, of Baltimore, have resumed grading at Centreville, and are laying track from Sadlersville southwest. The road is in a fair way to be completed.

Adrian, Saline & Detroit.

A company has been organized and some subscriptions received for completing a line from Adrian northwesterly to Detroit, which can most readily be effected by a railroad from Adrian to Saline, about 20 miles, whence the Detroit, Hillsdale & Indiana to Ypsilanti and the Michigan Southern from Ypsilanti to Detroit would complete the line.

Missouri, Kansas & Texas.

On the Sedalia & Fort Scott Division track laying is advancing toward Fort Scott at the rate of a mile and a half a day, and a week ago was within 35 miles of that place. Grading was begun on a line called the Osage division, which is to extend from Holden, 43 miles west of Sedalia, westward to a junction with the Junction City & Chetopa line in the vicinity of Emporia.

On the 40 miles of the Sedalia & Fort Scott line open in August 7,232,028 pounds of freight were carried. The freight receipts were \$16,137.27; passenger receipts, \$3,798.35.

South Shore of Massachusetts.

The extension of this road, which now extends along the south shore of Massachusetts Bay from Braintree on the Old Colony & Newport road ten miles south of Boston, to Cohasset, eleven miles, has been definitely located. It begins near the present terminus in Cohasset, runs through the villages of North Scituate, Scituate Harbor and Greenbush; thence crossing North River east of Little's Bridge, passes through East and South Marshfield, near Brant Rock and Cut River, to a point about one mile west of Duxbury, lower village. The length of the road is eighteen miles.

Maine Central.

Messrs. Straw, Patterson & Maney have sub-let fourteen miles of the Maine Central Railroad extension, which is to be completed by March 1st. The directors feel certain that the trains will be running over the extended road by mid-July of next year.

Waterville & Junction City.

A company has been organized to construct a railroad from Waterville, the present western terminus of the Central Branch Union Pacific Railroad, 100 miles west of Atchison, nearly due south about 50 miles to Junction City on the Kansas Pacific, the Northern terminus of the Missouri, Kansas & Texas Railway. Books will be opened for stock subscriptions on the 24th inst., and meeting for a permanent organization will be held in Junction City on the 2d of November. It is proposed to connect on the north with the Omaha & Southwestern road.

New York & Oswego Midland.

The boring of the Sawangunk Mountain for this railroad is already more than half finished. The Middletown *Mercury* says the heading at the east end has now reached about 1,600 feet from the entrance, and at the west end about 800 feet. The whole length of the tunnel is about 3,850 feet, but a very considerable part of the task to be done was the approach of the western end, now entirely leveled to the grade of the road. The survey for a temporary track over the mountains by the side of the wagon road revealed so steep a grade that the idea of using such a road was abandoned. Locomotives could draw a few cars easily up it, but the danger and difficulty of the descent would be so great that it is thought best not to undertake it. So the iron and other

materials will be brought over in wagons from the "horse-shoe" on the west side to the east end of the tunnel, and from that point the rails will be laid eastward until they meet the track-layers going westward from Middletown. The road is nearly all graded between these points.

Arkansas Midland.

The terms of the contract between the above company, and Col. H. F. Hale, of Junction City, Kansas, in the name of J. H. Seager & Co., are that the grading is to be done to Clarendon by November 1st, 1871, iron, rolling stock and everything complete by March 31st, 1872. The contractors are to receive the Phillip county and Helena bonds, and we suppose the State aid. The directors are to raise one hundred thousand dollars in money, a portion of which is already subscribed—get 100,000 acres of land subscribed, and ten acres of land in or near the corporation of the city of Helena. A corps of engineers will go to work at once and commence the grading as soon as ten miles have been located. The city is confident that the grading will commence on or before the first of November, and be completed to White river by the first of June, or before the hot weather commences next year.—*Helena Clarion*.

St. John's & St. Augustine.

Before the war the line of a railroad was partly graded from Tocol, Fla., on the St. John River, east about fifteen miles to St. Augustine, the Ancient City of the United States. Work has been resumed on it this season, and it is expected that it will be opened next Christmas for travel. The country on its line is unsettled and barren, and almost the only business expected is the transportation of tourists in winter.

St. Paul & Chicago.

The St. Paul *Press* of October 1 says: "The iron track of the Chicago & St. Paul Road has been completed to Red Wing, and in a few days, when properly ballasted, will be ready for the cars. This is about half the distance to Winona, and next year the railroad will probably be completed to that place, which, we hope, will, by that time, have a railroad connection with the 'La Crosse Road.'"

Toronto, Simcoe & Muskoka.

The route of this road has been located from a junction with the Northern Railway at Barrie, 64 miles north of Toronto, at the western extremity of Lake Simcoe, northeastward near the shore of that lake through the villages of Orillia and Atherley, Washago and Grauenhurst to Bracebridge. The Northern Railway Company has agreed to lease the road for 21 years as soon as it is completed.

Muscatine, Kewanee & Eastern.

It is expected that the survey of this proposed railroad will be made this fall from the Indiana line to Henry. The prospects of building it are said to be favorable.

Omaha & Southwestern.

This company, which has twenty miles of road in operation to a point on the Platte River opposite a station on the Burlington & Missouri River Railroad of Nebraska, will try to make arrangements with the latter company to use its track thence as far as Lincoln. From Lincoln it is proposed to construct the line nearly due south as far as Beatrice, near the Kansas line, about 40 miles. This place is nearly due north of Junction City.

Brownsville & Ohio.

This company advertises that proposals will be received until the 24th inst. at the office of W. D. Pickett, Chief Engineer, in Brownsville, Tenn., for grubbing, clearing, graduation and trestle work on the line of this road from Brownsville, a station on the Louisville & Memphis road 57 miles northeast of Memphis, nearly due north 22½ miles to the town of Friendship in Dyer county.

St. Louis, Vandalia, Terre Haute & Indianapolis.

The train which left Indianapolis for St. Louis on this line last Tuesday evening took out ten day and two sleeping coaches, all filled with passengers. There were on the train 300 excursionists on a visit to Kansas. The business of this line increases steadily and rapidly.

Missouri River, Fort Scott & Gulf.

Considerable improvements are being made on the road bed of this line, and its equipment is being largely increased to meet the demands of business, which increases rapidly. Already a considerable business in the transportation of Texas cattle has been developed, and there is every reason to believe that this business will increase rapidly and steadily in the future.

Cumberland & Pennsylvania.

The Uniontown *Genius of Liberty* says that the Cumberland & Pennsylvania Railroad Company are about to purchase the railroad of the Somerset Coal & Iron Co., extending from Barrelesville to Wellersburg. They propose to put the road in running order, and also to extend it across the mountain to Meyers' Mills and Elk Lick coal regions, for the purpose of conveying coal east and ore to their furnace at Mt. Savage. If this ex-

tension is made, the distance from Meyers' Mill coal region to Cumberland will be at least fifteen miles shorter by this route than by the Pittsburgh & Connellsville road.

Kansas Pacific.

This road is now carrying cattle to Kansas City all the way from Denver, and the Colorado cattle trade promises to become an important item in its traffic. Shipments of merchandise are made almost every day from Chicago to Denver by this route.

The Texas cattle trade, notwithstanding the partially successful efforts to obtain a share of it for Baxter Springs and the Lawrence road, continues to have its great shipping point at Abilene, and a considerable business in that line has sprung up at other stations on the Kansas, such as Lake and Kiowa.

Great Western.

The semi-annual meeting of the shareholders will be held in London on the 12th inst., at which time is expected that amalgamation will be effected with the Canada Air Line Railroad Company. Four directors and three auditors are to be elected at this meeting.

Rockford, Rock Island & St. Louis.

Last week passenger trains of this company ran for the first time from Rock Island to Coal Valley. During the past two weeks the company has had a large force at work putting down track upon the grade of the Peoria & Rock Island Company, from Coal Valley to Orion. The work will probably be finished next week.

West Wisconsin.

This road is to have a connection with the Madison & La Crosse line of the Chicago & Northwestern, which can be effected by constructing a road about 20 miles long southward from Tomah. It will bridge the St. Croix Lake opposite Hudson, and when completed will afford almost an air line route from Chicago to St. Paul.

Burlington & Missouri River.

Of this road, which is now completed and in operation 55 miles beyond Plattsmouth, on the Missouri river, an officer of the company writes us that "there will be 35 miles of road bed beyond Lincoln ready for track-laying by the coming spring. The surveys to Fort Kearney will be completed this fall. Our maximum grades so far have been 33 feet to the mile, and the radius of sharpest curvature is 1,637 feet."

Central Pacific.

It is reported that this company thinks seriously of building a railroad from Sacramento southwest to Benicia, about seven miles east of Vallejo, there cross the straits between the north end of San Francisco Bay and Suisan Bay, and run down the east side of the former bay to Oakland. This would give a direct route from Sacramento to San Francisco 80 or 90 miles long, while the present route is 135 miles long. This may be a movement to compel the sale of the California Pacific road (Vallejo to Sacramento), however. That road with an extension 26 miles long to Oakland will afford a route about 90 miles long.

St. Louis & Southeastern.

The following statement of the present condition of this work is from the *St. Louis Journal of Commerce*: "From East St. Louis to Mount Vernon, Ill., 75 miles, the grading is all done, and from the Kaskaskia river to Mount Vernon, 42 miles, the road is completed, and the cars running, crossing the Illinois Central at Ashley, 22 miles south of Odin. Track-laying on the unfinished portions is progressing rapidly, and will be completed sometime next month. The Company are also building from the Ohio River at Shawneetown, westward 15 miles, which section will be in running order by the 1st of November. The whole line from St. Louis to Shawneetown will be completed in 1871. At McLeansboro, 100 miles from St. Louis, the Evansville extension, (60 miles,) joins the main line, is now being worked upon near Evansville and will be completed within a year. The St. Louis & Louisville Air-Line route connects at Mount Vernon, and a portion of it will be completed this season. When completed, with connections, this railway will form, in part or whole, a new line, from St. Louis to Louisville, 250 miles; to Evansville, 100 miles, and to Nashville, Tenn., 284 miles."

Burlington, Cedar Rapids & Minnesota.

The branch on the northern section was completed to Waterloo last Saturday, and trains are now running through from Cedar Rapids to that place, a distance of about 60 miles. From Burlington to West Liberty, about 70 miles, the road has been in operation for some time, but from West Liberty to Cedar Rapids, about 30 miles, there is a gap to be filled, though the road bed is nearly completed.

A correspondent at Blue Earth City, Minn., writes to us that the citizens of that place have made a contract with this company for the extension of its road to that place, the cars to be running through by December 31, 1872. This extension will form a line about 125 miles

long northwest from Waterloo through Mason City to Blue Earth City. We understand that the line is to be graded from Waterloo northwest to Clarksville, about 25 miles, this fall, and complete the track to the crossing of the McGregor & Missouri River line, which may be at Clear Lake and may be at Mason City, within a year.

Port Huron & Lake Michigan.

Work has been resumed on this road, and it is thought it will be completed as far as Lapeer, 45 miles west of Port Huron and within 20 miles of Flint, by the 1st of December.

Peoria, Atlanta & Decatur.

A committee appointed by the township supervisors of Peoria lately examined the work done on this road between Atlanta and the junction with the Toledo, Peoria & Warsaw road, five miles from Peoria, and reported as follows:

"The company have a lease on the bridge and five miles of the Toledo, Peoria & Warsaw road. The largest portion of the grading from Atlanta to Peoria is finished. The grading is about completed from Atlanta to the south line of Mackinaw township, and the work is of the best character. Captain White, on the south end, deserves all praise for his energy and promptness in doing his work. The largest portion of the work on the Peoria end is completed, together with a large amount of work on Marion prairie. A great deal of the bridge timber is on the ground ready to be put in place."

Houston & Texas Central.

This company has a line from Houston 50 miles northwest to Hempstead, whence its main line is to extend nearly due north to the Red River, about 100 miles being completed. But from Hempstead it has a branch westward, completed to Burton, 38 miles. This branch is to be continued westward 72 miles farther to Austin, and in consideration of subscriptions from Travis county, amounting to \$75,000, the company has agreed to complete this extension by January 1, 1872.

Detroit, Hillsdale & Indiana.

The iron was laid to and the first train entered Manchester, on the Jackson Branch of the Lake Shore & Michigan Southern, last week. The length of line now completed, from Ypsilanti to Manchester, is 25 miles.

New Peoria and Burlington Route.

The *Peoria Transcript* says that the Toledo, Peoria & Warsaw, the Rockford, Rock Island & St. Louis, and the Burlington, Cedar Rapids & Minnesota companies have entered into contracts whereby they will be operated in close connection, affording by the first two a new route 98 miles long between Peoria and Burlington, and by the third giving direct access to the country for 160 miles northward from Burlington this winter, and further hereafter. The Rockford road will afford about 40 miles of this line, from Burlington to Bushnell. The Toledo, Peoria & Warsaw is likely to be most benefited by such an arrangement, as it will have the traffic for the East over the greater part of its line.

North Missouri.

The bridge over the Missouri at St. Charles, which is the one thing that this road most needs, will probably be completed about the 1st of January.

Since the completion of the Kansas Pacific an additional train has been put on between St. Louis and Kansas City, connecting at the latter place with the evening train west on the Kansas Pacific.

New Orleans, Mobile & Chattanooga.

This road is completed from New Orleans about 20 miles north of east to Fort Macomb. The starting point of the Texas division will be from the foot of St. Joseph street, New Orleans, crossing the river on a ferry boat built for the purpose. This boat will have a capacity for eleven loaded cars and a locomotive, and is now in course of construction at New York.

International Railroad.

Of this proposed railroad across Texas, the *Galveston News* says that the incorporators have means to proceed with the work without depending upon European capital. The amount of stock subscribed is \$2,000,000, with 20 per cent. paid in on the first installment. Engineers will immediately commence surveys for the road. The officers and directors are as follows: John S. Barnes, of Texas, President; James E. Barnes, of Texas, Vice-President; Thos. W. Pearsall, of New York, Treasurer; Paul N. Spofford, of Texas, Secretary; T. W. House, Financial Agent; James S. Kennedy, of New York; H. G. Marquand, J. Walter Phelps, H. W. Grady.

St. Louis & Keokuk.

The assets of the company have been transferred to a construction company, composed of Maj. J. S. Wolf, S. D. Carpenter, J. C. Angle, and others, who will push the road to completion without unnecessary delay. Josiah Fogg resigned his position as President and director of the company, and Isaac L. Garrison and E.

Hayden, directors, also resigned. The following is a list of the present officers: President, S. R. Woolfolk, of Lincoln county; Vice-President, Abraham McPike, of Ralls county; Secretary, N. H. Parker, of St. Louis; Treasurer, L. E. Alexander, of St. Louis; Chief Engineer, Milo Smith, of St. Charles county; Attorney, J. D. S. Dryden. Directors—Levin H. Baker, James B. Eads, Freeman Barnum, James McKenzie, of St. Louis; N. S. Dimmitt, Abm. McPike and Wilson B. Elliott, of Ralls county; Samuel F. Murray, Prosper P. Parker and Stephen J. Reynolds, of Pike county; Walton Perkins, Shapleigh R. Woolfolk and David T. Waddy, of Lincoln county. The road is graded through Ralls county, 15 miles, and in process of construction in Lincoln. The force from Ralls will soon be added to that already in Lincoln. The section now under contract is from Wentzville on the North Missouri Railroad to Hannibal.—*St. Louis Journal of Commerce*.

Monroe, Wayne & Holly.

The completion of this line was supposed to be ensured by certain negotiations with the Flint & Pere Marquette, to which the former road would serve as an outlet to Toledo. Now, however, the Detroit & Milwaukee road offers the Flint & Pere Marquette 40 per cent. of its earnings between Holly and Detroit in return for its business. This offer seems to dispose of the Flint & Pere Marquette Company to give up the project for a Toledo connection, which will cost nothing. It will be very fortunate for Detroit if this disposition remains.

Springfield & Illinois Southeastern.

On the northwestern extension of this road, from Springfield to Beardstown, 45 miles, the grading has been in good part completed, and tracklaying is commenced. A contract has been closed recently for rails enough to complete this division. It is understood that close connections will be made at Beardstown with the Rockford, Rock Island & St. Louis road.

Minnesota & St. Louis.

The grading of more than ten miles of this line has been completed, and a considerable force is prosecuting the work.

Davenport & St. Paul.

There was a meeting of the directors of this company in Davenport on the 27th ult. A stockholders' meeting will be held on the 19th inst. In Delaware county, a number of citizens have organized the "Delaware Construction Company," electing Robert Eddy President and Treasurer, and John Brayton Secretary. This company has taken the contract to grade, bridge and tie the road through Delaware county, about thirty miles. J. P. Ball, R. Boon and N. Moor have taken some of the grading on sub-contract.

Messrs. Squires, Cummings & Westlake have the contract for bridging between Davenport and DeWitt. The long bridge over the Wapsie is completed and the approaches over the bottom land are nearly finished. The main bridge and approaches measure eleven hundred feet. There are also about two hundred feet of bridging across side channels, where water runs only in wet seasons, making in all thirteen hundred feet of water way.

The track is being laid at the rate of half a mile a day. About twelve miles of iron is already down.

St. Paul & Chicago.

The work of laying iron was completed to Red Wing last week, a distance of twenty one miles. The gang of track layers are to be transferred to the state line, and engaged in completing the Milwaukee & St. Paul Company's new road to Mason City, after which they will return to Minnesota City, the point where the line leaves the Winona & St. Peter Railroad six miles from Winona, from which it is intended to build to Weaver, forty-four miles, before cold weather sets in. This leaves a gap of a little over forty miles between Red Wing and Weaver to be constructed next season, for which the contracts are all let and considerable work done.

Iowa Midland.

The Chicago & Northwestern Company, which has recently obtained possession of this road, offers to cancel the subscription of Anamosa of \$38,000 for twenty cents on the dollar; so it is reported.

Middletown, New Haven & Willimantic.

Portland, Connecticut, voted almost unanimously in favor of a subscription of \$108,000 to this company, on the 3d inst.

Indianapolis, Bloomington & Western.

Trains commenced running on the road last Monday as follows: A passenger and mail train leaves Peoria every morning (except Sunday) at 7 o'clock, and arrives at Indianapolis at 5:30 p. m. A similar train leaves Indianapolis every morning (except Sunday) at 4 o'clock, and arrives in Peoria at 2 p. m. On the 10th inst. an additional passenger train will be put on the road, which will leave Peoria daily (except Sunday) at 11 a. m., and

arrive in Indianapolis at 7:15 p. m.; it will leave Indianapolis at 7:45 p. m. and arrive at Peoria at 5 a. m. An accommodation train will leave Peoria each day at 6:30 a. m., and arrive at 4:45 p. m.

Ottawa, Oswego & Fox River Valley.

Most of the grading and bridging between Ottawa and Aurora is completed, and contractors are working rapidly on what remains. The road runs near the bank of Fox River all the way, and therefore crosses many streams near the outlets, making many bridges and much trestle work necessary. Parties are laying track from Ottawa northward and from Aurora southward. A week ago the track was completed on the Ottawa end as far up as Indian Creek, about seven or eight miles. It is expected the road will be completed as far as Aurora by the middle of October or thereabouts.

Sioux City to the Red River of the North.

A new railroad project has been organized at Sioux City. It is to build a line from that point directly north up the valley of the Big Sioux River, and thence down the Valley of the Red River of the North to the Pembina settlements. Its length will be about 480 miles and it will cross the Northern Pacific about 250 miles north of Sioux City. The officers are: President, W. W. Walker; Vice-President, Geo. Douglas; Secretary, John Cleghorn; Treasurer, J. P. Allison (both of Sioux City); and Chief Engineer, J. E. Ainsworth, of Dubuque. Mr. Ainsworth will at once commence the survey of the line.

Panama Railroad.

The following concerning the Panama Railroad is taken from a circular of the President of the company, issued on the 24th ult.:

The gross earnings of the road for the nine months ending Sept. 30th, 1870, were—Collected.....\$955,318 92
Parts of August and September, for which returns are not received—Estimated.....150,000 00
\$1,105,318 92

From which we deduct—

Subsidy to Columbian Government.....\$187,500 00
Interest on bonds.....162,328 74
Working expenses*.....388,870 06
Office expenses.....25,138 67
\$764,358 07

Net for nine months.....\$340,960 85

The present condition of the company is as follows:

Cost of the railroads, including payments for extended contract.....\$9,500,000 00

Cash assets, viz.:

Amount in bank and loans on demand.....\$455,563 92
United States 6's, 1851, at par.....100,000 00
In hands of bankers and agents.....191,905 00
\$747,468 92

Four steamers in the Central American trade, and amount paid on additional one now building.....\$550,000 00
Steam tugs and iron launches in the Bay of Panama, sailing vessels, etc.....250,000 00
Real estate in the city of Panama, and one-half ownership of islands in the bay, at cost.....73,140 00

Vacant lands on the Isthmus, amounting to about 300,000 acres, the value of which it is difficult to estimate.

The capital stock is \$7,000,000.

There is no floating debt.

The bonded indebtedness of the company is as follows:

Payable in 1873.....\$123,775 at \$1 85 \$740,958 75
" 1875.....19,350 " 93,947 50
" 1897.....597,800 " 1,899,330 00
\$740,925 \$3,734,136 25

To meet this sinking fund has been provided, which is invested as follows:

\$100,000 U. S. 6's, 1865, at 112.....\$112,000 00
\$10,000 U. S. 6's, 1867, at 110 50.....110,500 00
\$24,000 Consolidated Bonds of the Ohio & Mississippi Railroad Company, at 87½.....175,000 00
150 shares Panama Railroad Company, at 77½.....116,250 00
Loans on Collaterals—Cash in Trust Company and accrued interest.....675,634 00
\$1,189,404 00

Which, with accumulations, will retire the bonds at maturity.

*Corresponding period of 1869—\$784,071.

Welland Railway.

Notice has been given in behalf of the preference bondholders, that an application will be made to the Parliament of Ontario, at its next session, for the passage of an act providing for the winding up of the Welland Railway Company, and for the sale of the Welland Railway and the lands and works connected therewith, and the propellers, rolling stock and plant thereof, and used in connection therewith, in such manner as may seem best, or for such other measure of relief for the bondholders as shall be proper under the circumstances.

Grand Rapids & Indiana.

This road will be opened for business next Monday, when trains will run through between Fort Wayne, Ind., and Paris, Mecosta county, Mich., a distance of 200 miles. The road is operated by the Pittsburgh, Fort Wayne & Chicago Company. It will make its connections for Chicago business, to and from points south of Kalamazoo, with the Michigan Central.

Port Royal & Augusta.

A railroad is in course of construction from Port Royal, a fine harbor between Charleston and Savannah, northwestward to Augusta, Ga. The Baltimore Sun says that a company of Northern capitalists have taken charge of the road and announce their purpose to have

a continuous air line road from Port Royal through Memphis to Kansas City. This road from the Atlantic is to pass Opelika, Tusculumbia and across Alabama to Memphis.

Central Pacific.

The snow sheds near Cisco have been burning again; but only one train was delayed by the accident. The sheds will be rebuilt immediately. The earnings of the Central Pacific Railroad for September are \$833,412, the heaviest traffic since the road was opened.

New York and the South.

The New York *Evening Post* in a recent issue says that a number of new Pullman palace cars have just been put on the great northern mail route, (Alexandria, Lynchburg, Knoxville, Chattanooga, Grand Junction, Jackson, to New Orleans), which run through without change between New York and Lynchburg, Va. There are only two changes of cars on this road between New York and New Orleans, one at Lynchburg and the other at Chattanooga. The change at Lynchburg is necessary on account of a break in gauge, the Lynchburg & Alexandria line, like the northern roads, having the common 4 ft. 8½ in. gauge, and the other lines southward having 5 ft. gauge, which prevails in the South. The *Post* adds: "Southern emigration is at present quite flourishing, and several colonies from two to three hundred each in number, have within a short time chartered cars at reduced rates and proceeded in a body to prominent southern points—a majority of the colonists settle in Georgia."

"A company of English weavers and spinners from Manchester, filling two large passenger coaches, a short time since emigrated to Columbus, Ga., by the Great Southern Mail Route."

ELECTIONS AND APPOINTMENTS.

—John R. Burnett, formerly Collector of the Morris Canal & Banking Company, has been elected Secretary of the company *vice* John Rogers, deceased.

—The following gentlemen have been elected directors of the Monadnock Railroad Company; Oscar H. Bradley and Peter Upton, of Jaffrey; J. H. Fairbanks, of Winchendon; Henry K. French, of Peterborough; Baxter D. Whitney, of Winchendon; and H. A. Blood, of Fitchburg. President, Jonas Livingston, of Peterborough; Treasurer and Clerk, W. B. Hatch.

—The following directors have been elected for the recently organized Adrian Saline & Detroit Railroad Company: Henry Hart, Henry A. Angel, R. R. Beecher, W. H. Waldbury, E. L. Clark, Porter L. Sword, Abel Whitney, F. J. Buck and C. M. Crosswell. R. R. Beecher is President, C. M. Crosswell Secretary and W. H. Waldbury Treasurer. N. S. Andrews is the engineer in charge of the survey.

—J. D. Herkimer has resigned his position as Superintendent of the Indianapolis & St. Louis Railroad, and A. A. Talmadge has been appointed in his place. Mr. Talmadge has for some time been Assistant Superintendent with headquarters at Litchfield, Ill.

—Mr. Ex. Norton has lately resigned the presidency of the Mississippi River Railroad Company and Mr. A. T. Lacey has been elected in his stead. The other officers of the company are: Dr. D. M. Henning, Vice-President, and Mr. John L. Norton, Secretary and Treasurer.

—Mr. Geo. L. Harrison has been promoted to the position of Train Master of the Western Division of the Indianapolis & St. Louis Railroad, and Mr. J. F. Redman to the same position on the eastern division of the road.

—Mr. Ralph P. Zublin, who was a private in the Iowa First Regiment, and went to work as brakeman on the Dubuque & Sioux City road after serving in the army, and who has gradually advanced in position ever since has been appointed Superintendent of the Northern Division of the Iowa Central, which embraces the line from Marshalltown to the Minnesota line. Amos Russell, who was a Sergeant in the Iowa First, has been appointed Train Master of the road.

—C. A. Lynch has been appointed General Ticket Agent of the Indianapolis, Peru & Chicago Railroad, in place of A. B. Southard, who has been appointed Secretary of the company.

—At the stockholders' meeting of the Toledo, Wabash & Western Railway Company, held in Toledo on the 5th inst., the following were elected directors for the ensuing year: Azariah Boody, Isaac H. Knox, A. M. White, Wm. Kidd, A. B. Baylis, Horace F. Clark, S. B. Chittenden, Jas. H. Banker, Augustus Schell, all of New York; George Cecil, Logansport, Ind.; James Spears, Lafayette, Ind.; C. M. Smith, Springfield, Ill.; Warren Colburn, J. N. Drummond, Toledo, Ohio; Amasa Stone, Jr., Cleveland, Ohio. Of these, Chittenden, Banker, Schell and Colburn are new men in the board, succeeding Wm. I. Schenk of New York, Wm. Mason, of Taunton, Mass.,

C. A. Savage of Quincy, Ill., and E. B. Phillips, of Chicago. Of the new board, Clark, Banker, Boody, Stone and Schell are also directors of the Lake Shore & Michigan Southern, and Schell, Clark and Banker are directors of the New York Central & Hudson River Company. It is a strong Vanderbilt board.

—The Illinois State Board of Equalization of Taxes has appointed the following Committee on Equalization of Railroad Property: J. D. Platt, A. H. Dolton, B. W. Henry, J. T. Jenkins, J. J. Perri, J. B. Randall, L. A. Divine, W. H. Reed, J. Piper.

—T. E. Sickles, Chief Engineer of the Union Pacific Railroad, has been appointed General Superintendent in place of C. G. Hammond, resigned.

—The following appointments have been made on the Grand Rapids & Indiana Railroad, dating from October 1: Chas. E. Gorham, Superintendent; H. D. Waller, Assistant Superintendent of Southern Division; John L. Shaw, Assistant Superintendent of Northern Division; Wm. P. Smith, General Freight Agent; F. R. Myers, General Passenger and Ticket Agent; F. A. Gorham, Auditor. The General Superintendent is Superintendent of the Western Division of the Pittsburgh, Fort Wayne & Chicago Railway, and the General Freight Agent and the General Ticket Agent hold the same positions on the Fort Wayne road, of which the Grand Rapids & Indiana is, practically, a branch line.

TRAFFIC AND EARNINGS.

—According to the report of the Northern Railway of Canada for the half-year ending June 10, 1870, the gross traffic receipts from all sources amounted to \$333,423.36 as against \$310,012.60 for the corresponding period of 1869, being an increase of 7.55 per cent. in favor of the last half-year. The ordinary working expenses of the half-year have amounted to \$199,812.42 as against \$168,094.89 in 1869, being at the rate of 59.90 per cent. of the gross earnings, as in comparison with 54.22 per cent. in the previous year—an increase due in part to a more liberal expenditure in repairs of permanent way and of locomotive and rolling stock; and in part to exceptional outlay caused by the excessive snow storms of last winter, and to the loss of cordwood by fires upon and in the neighborhood of the line. The road extends from Toronto northward to Collingwood, 94 miles.

—The Montgomery & Eufaula Railroad, when completed, will extend from Montgomery southeast to Eufaula, Ala., about 89 miles. On the 35 miles in operation the earnings for the year ending April 30, 1870, were as follows:

From passengers.....	\$33,407 86
From freights.....	35,108 28
From mails.....	675 10
From other sources.....	45 78

Total.....	\$69,236 02
Expenses.....	\$49,104 96

Net earnings.....\$20,131 06

—The Boston & Maine Railroad extends from Boston 76½ miles to South Berwick Junction, on the Portland, Saco & Portsmouth Railroad. It has three branches less than four miles long, leases the Danvers Railroad, 9½ miles long, the Newburyport Railroad, 27 miles long and the Dover & Winnipiseogee Railroad, 28½ miles, operating altogether 146 miles of road which form routes between Boston and Portland, Boston and Newburyport, and Boston and Alton Bay. The earnings of this road for the years ending May 31, 1869 and 1870, were as follows:

	1869.	1870.
From passengers.....	\$997,597	\$1,113,119
" freight.....	689,913	698,851
" rents.....	37,568	32,702
" mails.....	14,189	14,518
" interest, &c.....	3,474	11,865

	1869.	1870.
Expenses.....	\$1,761,498	\$1,866,061
	\$1,304,503	\$1,316,947

Two five per cent. dividends were paid during the year.

—The Ogdensburg & Lake Champlain Railroad extends from Ogdensburg to Rouse's Point, N. Y., with branches amounting together to four miles. On the 1st of March last it was leased for 20 years by the Vermont Central Company. The fiscal year closes March 31, and therefore the report for the last year gives absolute earnings for eleven months and the rental for one month. The report gives these figures:

The gross earnings for eleven months, ending Feb. 28, 1870, were.....	\$1,025,091 95
The gross earnings for March, which were received by the Trustees and Managers of the Vermont Central and Vermont & Canada Railroad were.....	54,343 07

Gross earnings for twelve months, ending March 31, 1870, were.....	\$1,079,385 02
Expenses for same period, exclusive of the cost of wharf property and warehouse.....	608,061 44

Net.....	\$471,323 58
The gross earnings for twelve months, ending March 31, 1869, were.....	1,045,281 70
Expenses for same period.....	628,322 46

Net.....	\$416,959 24
Showing a gain in gross earnings of.....	34,103 32
And a reduction in expenses of.....	20,318 09

Net gain.....\$446,641 34

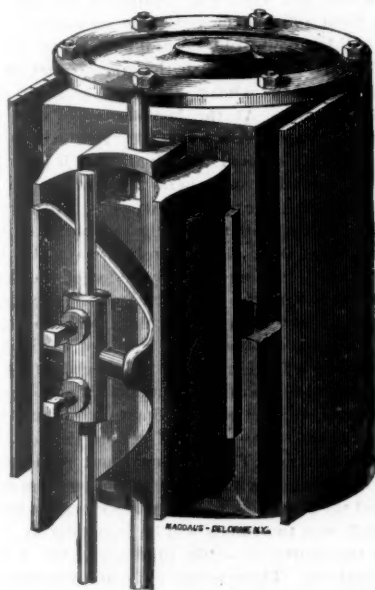
the link, and consequently the travel of the steam valves and the point of cut-off, are controlled by the governor.

Although the piston speed of this engine—600 feet per minute—is not so great as that of a locomotive with 24-inch stroke and $4\frac{1}{2}$ -foot driving wheel, running at the rate of 30 miles per hour, the high rate at which the engine is run is a subject of universal remark among the "mechanical" visitors to the fair.

One theory which is advocated by the designers of this engine and put into practice by them will, we think, be received with very lively dissent by large numbers of engineers: we refer to what is called "the reciprocating fly wheel." That the reciprocating parts of a fast running engine should be as light as possible has always seemed to us one of the established points in engineering which are beyond question. Instead of its being so, however, we have here in the descriptive pamphlet of the Allen engine a long discussion showing some, at least plausible, reasons for making "the reciprocating parts as heavy as possible," and we have an engine with a 16-inch cylinder in which the piston-head is made eight inches thick, of solid cast iron, and the reciprocating parts weighing altogether 1,000 pounds, and with the engine running almost perfectly noiseless and without any perceptible jar to what is a very unsubstantial building. It is not our purpose now to examine this subject critically or to express any opinion in reference to the theory, but we may return to it in the future.

The workmanship of the engine seems to be of the best character, the parts well proportioned, and with a style about the whole machine which indicates a sort of refined mechanical instinct in the designer.

Messrs. Handren & Ripley, of the Albany Street Iron Works, exhibit a small vertical engine with the Rider cut-off, and a model showing its construction. The engraving below represents the valves of the engine.



The under or main valve is similar in construction and operation to the common slide valve, with the exception that the steam is admitted into the cylinder through ports cast in the valve. The upper port is shown in the cut. The back of the main valve is made and finished to a semi-cylindrical form, as shown in the cut, and has a cut-off valve accurately fitted to it. The ports in the face of the valve are "square" with it and the cylinder; whereas in the back they are inclined to the axis of the semi-cylinder and towards each other. The cut-off valve is of a sort of V shape, as shown in the engraving. Each of the valves has a reciprocating motion imparted to it by the valve stems. It is well known by persons who have studied the slide valve, that a variable lap is more effective in changing the point of cut-off than variable travel. It is obvious from the engraving that if the cut-off valve were rotated by the spindle or stem, the lap of the valve over the ports would be either increased or diminished, according to the direction of rotation, and that with a uniform travel of the two valves the point of cut-off can be varied simply by rotating the spindle of the cut-off valve. This is the secret of the Rider cut-off. The rotation of the valve stem, and consequently the point of cut-off, is regulated by the governor.

The valve gear having a positive motion has in this respect the same advantage for running at high speeds that the Allen engine has, but the valves not being "balanced," the cut-off would probably not be quite so sensitive to the governor as they would be if they had no pressure on them.

The New York Safety Steam Power Company exhibit

two small vertical engines of very simple and graceful design, of which we give an engraving below.



The one has a cylinder 6 inches and the other 9 inches in diameter. "The engines consist of three principal parts: the cylinder; the frame, which is a tapering column of curved outline; and the base, which elevates the shaft sufficiently for the fly wheel to clear the floor. The slides and pillow blocks are cast with the column, so that they cannot become loose or out of line; the rubbing surfaces are large and easily lubricated."

For light work we have never seen a more compact and simple engine than this. It is without any refined complication or delicate machinery, and it looks as though it might be entrusted with entire safety to the care of the most ignorant Celt, the densest Teuton, or the stupidest American citizen of African descent.

Messrs. Russell & Speer, of Newark, N. J., exhibit three small engines and boilers combined, patented by William Baxter. The boilers are vertical, with a peculiar arrangement of tubes which it would be difficult to describe clearly without an engraving. The engine is mounted on the top of the boiler, and one peculiarity is that the cylinder is immersed in the steam space of the boiler. Although this must be a source of some economy in the use of steam, yet the inconvenience of getting at the valves or cylinders, in case any repairs were necessary to either, we think would in such small engines more than counterbalance the economy which would be effected thereby. The engines and boiler are, however, very compact and portable and occupy very little more than a good sized cook stove, and they will do their work with about as much fire as could be carried in an ordinary coal scuttle.

Next week we will give a description of the other machinery, etc., at the fair.

The Chicago and Omaha Business.

We learn that the three lines which carry passengers between Chicago and Council Bluffs have made an agreement to "pool" the earnings on through business between these two places and divide them equally. The history of this business would, doubtless, be very interesting and profitable for instruction and to some, perhaps for reproof. When the Union Pacific was completed the Chicago & Northwestern had a monopoly of the business and made money out of it. Very soon, however, the Chicago, Rock Island & Pacific line was completed. It sent its agents to the Pacific coast and soon gained a large part—perhaps the largest—of the travel from that direction. Of course the Northwestern would not permit travel to leave it without a struggle, and it at once sent out agents and made unusual efforts to retain and gain business. In a few months the Burlington & Missouri River Railroad was opened to Council Bluffs and a third route opened. It immediately entered the field with its agents and made the competition stronger. All these lines maintained agents—usually remarkably able men—on the Pacific coast, and paid commissions, "posted"

abundantly, and were "liberal" in their expenditures to secure business. The three lines are of almost exactly the same length, the difference being not more than ten miles between the longest and the shortest; all are elegantly equipped, and each is likely to satisfy entirely the passenger who travels over it. As the result of the competition, no one line has been able to get the advantage of the other, and the companies concerned have paid for obtaining business very nearly the amount received from it—a condition of things very satisfactory to the race of "scalpers" who received fat commissions, but hardly as much so to stockholders and managers who have an eye to economy.

By the new arrangement we are informed that the companies concerned will save \$50,000 per year on the Pacific coast alone. If they lose any business it will be solely because of the efforts of the "scalpers," who, unwilling to let any business go to lines which will not divide the receipts with them and naturally anxious to get business which does pay them a commission, may be able to turn part of the business from Chicago to St. Louis. If the Kansas Pacific should enter the field, it is the Union Pacific and not the Chicago & Council Bluffs lines which will be compelled to work against it. Heretofore it has had to make very little effort to obtain business, as all the railroads in the country were interested in bringing business to it. It will be a change which some roads will relish for it to be compelled to share the expenses of obtaining traffic.

Chicago to Denver.

The Kansas Pacific Railway has been considered as peculiarly "a St. Louis road," affording to St. Louis the advantages which the Union Pacific has given to Chicago, and opening to it a field of its own which Chicago could cultivate only at considerable disadvantage. Especially, it was thought, the new road would put St. Louis on a great thoroughfare between the East and the West and bring through that place a large share of the travel between the Atlantic States and the Pacific coast, and much the largest part of that between the former States and Colorado and New Mexico. New York, Philadelphia, Pittsburgh, Cincinnati, Louisville, St. Louis, Kansas City, Denver—all these are on nearly a straight line, from which Chicago is two hundred miles north.

But so soon since the opening of the line, the travel from Chicago has grown so large as to justify the establishment of a through line of sleeping cars between Chicago and Denver. On Monday last the Chicago, Burlington & Quincy Company put such a car on the train leaving Chicago at five o'clock in the afternoon, and we learn that then and since this car has been well patronized, and the line promises to be very successful. This is but one of three lines which connect Chicago with the Kansas Pacific.

This line, by the way, is the longest in the United States on which cars run through without change, except that from St. Louis to New York by way of Toledo, which is 1,168 miles long. Our Chicago & Denver line is 1,127 miles long.

Colonel Hammond's Successor.

A telegram from Omaha announces that Mr. T. E. Sickles, since last spring Chief Engineer of the Union Pacific Railroad, has been appointed General Superintendent of that road in place of C. G. Hammond, resigned.

NEW PUBLICATIONS.

Lyle's Railway Manual for 1870-71.

We have received a copy of Lyle's Official Railway Manual for 1870 and 71, published by Walton & Co., No. 50 John street, New York.

This is a volume of 810 pages, printed on luxurious cream-colored paper, and altogether, if it were not for a certain loudness about the advertisements, it would make an ornament for a parlor table. The index gives the names of 1,442 railroads, which are arranged in the *Manual* alphabetically, and of the majority of them, the names of all the principal officers are given and such general statistics as railroad men and persons dealing with railroads constantly find it necessary to refer to. There are 570 pages of the *Manual* filled with this matter, besides which 85 pages are occupied by what the compiler calls the "railway miscellany," which is made up of paragraphs of general information in relation to new and projected roads.

There are 155 pages filled with advertisements, among which we find the names of some of the most reliable and extensive dealers and manufacturers of railroad machinery and material.

The index is admirably arranged and the whole "get-up" of the book indicates enterprise, experience and good taste.

From Henry Carey Baird, No. 406 Walnut street, Philadelphia, we have received *Railway Property*, a treatise on the construction and management of railways by John B. Jervis, C. E., and *Griswold's Railroad Engineers' Pocket Companion for the Field*, each of which we will review in a future number.

Chicago Railroad News.

The General Ticket Agents' Convention.

In the last number of the GAZETTE we gave the first day's proceedings of the convention, held on Thursday of last week. The convention continued its session Friday and Saturday morning. Friday morning the report of the Committee on Transcontinental Transportation, appointed to take under consideration the cultivation of an Australian trade, as suggested by Mr. Nelson's address, made a report asking for the publication of Mr. Nelson's address, and advising that each member request the co-operation of his general managing officer towards securing the passage of a bill by Congress providing for a steamer line between San Francisco and Australia, and recommending the appointment of a committee to confer with the representatives of the steamer lines and establish through rates.

Mr. Nelson said that as soon as he returned to California, his speech would be published in pamphlet form and two copies would be sent to each of the members of the convention.

The committee's report was adopted, and the following committee from the lines interested was appointed to confer on rates: T. H. Goodman, Central Pacific; Francis Colton, Union Pacific; H. P. Stanwood, Chicago & Northwestern; E. St. John, Chicago, Rock Island & Pacific; Samuel Powell, Chicago, Burlington & Quincy; C. H. Kendrick, New York Central; W. R. Barr, Erie Railway; H. W. Gwinner, Pennsylvania Railroad; M. Cole, Baltimore & Ohio.

Mr. Goodman, on the part of the Central Pacific, asked that the through rates between New York and San Francisco be not changed, no matter what change took place in the rates between New York and Chicago, or Chicago and Omaha. They had established agencies in the Sandwich Islands, Singapore, Yokohama, and other places, and it was difficult to advise these agents in less than six months. The rate between New York and San Francisco had been reduced; they felt that the rate on the Central Pacific was now rather high, and they would like to make a reduction, but if the lines east of them raised their rates, they could not make the necessary reduction. They had to compete with a line of first-class side-wheel steamers going to New York, and they could not drive them off until they drew off the passengers, by carrying them at lower rates across the continent. When these "side-wheelers," as they call them, were off, they would not abuse the monopoly which they would then hold. They had to deal in coin and currency, and either the public or the company lost by sudden fluctuations.

Mr. F. R. Myers said Mr. Goodman might calculate for three years that the rate between New York and San Francisco would not go higher than \$130. It would never do so. He would like to see the rate reduced to \$125.

The matter then dropped.

A despatch was received from the managers of the Cincinnati Industrial Exposition complaining that reduced rates for visitors to their fair had not been made on all the roads, as is usual. The matter was referred to a committee consisting of Lord, of the Indianapolis, Cincinnati & Lafayette; O'Brien, of the Pittsburgh, Cincinnati & St. Louis; and Stevenson, of the Cincinnati, Hamilton & Dayton. This committee reported that all but one line running into Cincinnati had reduced the fare for persons attending the exposition; that no discrimination against Cincinnati had been made, and that the convention could take no official cognizance of the despatch as it referred to the individual action of the several railroads to whom the Committee of Transportation had previously applied.

Saturday's proceedings were confined chiefly to revising rates, in which, however, few changes were made, the most important being the reduction of the rate between New York and St. Louis from \$25.50 to \$25.

The next meeting of the Association will be held in Savannah, Ga.

Chicago & Alton.

The report of estimated earnings for the month of October is as follows:

1869	\$506,623 30
1870	498,635 51

Decrease (1½ per cent.).....\$7,987 67

Grading is progressing on the Whitehall & Louisiana line, and contracts have been let to the American Bridge Company for the bridges, including one over the Illinois River 1,300 feet long.

Chicago, Rock Island & Pacific.

The Treasurer of the company, Mr. Francis H. Tows, makes the following announcement:

"A dividend of four per cent., free of United States tax, has been declared, payable on the 17th day of October next, to stockholders who shall be registered as such on the closing of the transfer books. The transfer books will be closed on the afternoon of the 8th day of October, and opened on the 2d day of November next.

"The capital stock of the company has been increased \$1,000,000, in conformity with the proceedings of the stockholders, at their meeting in June, 1869, and the same is offered to stockholders, in the proportion of one additional share to each sixteen shares held by them on the closing of the transfer books; said stock to be subscribed and paid for on or before the 1st day of November next, at which date negotiable scrip will be issued entitling the holder to convert the same into shares of stock on and after the 1st of December next, when presented in sums of \$100, or any multiple of the same.

"Stockholders, not having complied with the above requirements by the 1st day of November next, will be considered as having waived their right to subscribe, and the stock will be otherwise disposed of."

Chicago, Burlington & Quincy.

This company last Monday put a car on the 5 p. m. train to run through from Chicago, by way of Kansas City, to Denver, the terminus of the Kansas Pacific Railway. Hereafter such cars will leave Chicago every Monday and (we believe) Thursday, in connection with this train. So far the business has opened well, and it is probable that there will be a car daily soon.

This gives the road through cars to Kansas City on two trains and adds to the accommodations to that place as well as to points on the Kansas Pacific farther west.

The company is having the Westinghouse atmospheric brake applied to the Pacific and Atlantic express train which runs through between Chicago and Council Bluffs. It will also be attached to those cars of the Burlington & Missouri River Railroad which run on this train.

Illinois Central.

This company reports, as follows, its receipts for September, 1870:

LAND DEPARTMENT.			
Acres construction lands sold	5,541.56	for	\$55,058 43
Acres interest fund lands sold	40	for	440 00
Acres free lands sold	440	for	9,425 00
Total sales during month of Sept., 1870	6,011.56	for	\$64,923 43
To which add town lot sales			165 00
Total of all	6,011.56	for	\$65,088 43
Cash collected in September, 1870			\$306,988 95

ESTIMATED EARNINGS—TRAFFIC DEPARTMENT.

	In Illinois 707 miles.	In Iowa 267 miles.	Total. 974 miles.
Freight	\$476,945 07	\$91,578 00	\$568,523 07
Passenger	17,038 63	45,973 71	63,012 34
Mails	6,375 00	1,329 08	7,704 08
Other Sources	74,000 00	1,979 92	75,979 92
Total, Sept., 1870	\$574,358 69	\$143,859 70	\$718,218 39
Total actual earnings, Sept., 1869	\$819,786 83	\$159,613 93	\$979,400 76
Decrease	\$245,428 14	\$16,754 23	\$262,182 37

This is a decrease of 11½ per cent. on the Illinois lines, 10½ per cent. on the Iowa lines, and 11½ per cent. on the whole traffic.

The company has not yet accepted the road from Fort Dodge to Sioux City, which it has a contract to lease from the Iowa Falls & Sioux City Company, though the track has been laid through for nearly two months. The Illinois Central will take it when it is put thoroughly into condition, and the contractors are still engaged in completing the work.

PERSONAL.

—Thomas Prosser, an engineer and inventor of remarkable ability and a writer on engineering topics, for some time past engaged in the railroad supply business and especially well known as the head of the house of Thomas Prosser & Son, agents of Krupp's Cast Steel Works for the United States, died at his house in Brooklyn on the 15th ult. at the age of 69 years.

—Referring to the report that Mr. E. B. Phillips would be invited to accept the presidency of the Boston, Hartford & Erie Railroad Company, the Boston *Advertiser* says: "In this community it is only necessary to mention the name of Mr. Phillips, to recall his eminent qualifications. His experience in every department of railroad enterprise; his familiarity with the wants of this community, and of the business of the great West, for which we seek new outlets; his purity of character, his rare union of civility with decision and firmness; his knowledge of men, especially of railroad men, and his skill in the use of men and resources,—combine to make him the right officer for the place."

—A committee of the Kansas Pacific excursionists was appointed to procure testimonials of gratitude to certain of their hosts to whom they were especially indebted for the enjoyment of the occasion. This committee this week sent to A. B. Pullman, Superintendent of the Pullman Palace Car Company, a very beautiful and costly pair of sleeve buttons, with an appropriate inscription and a letter of presentation. It also sent to Col. C. B. Lamborn, Secretary of the Kansas Pacific Railway Company, a handsome gold watch and chain for his little daughter who was born the day the excursion party reached Denver. This watch has the inscription: "To Col. C. B. Lamborn, for his daughter Anne Beatrice Lamborn. A birthday present, Sept. 4, 1870, from the guests of the K. P. R. excursion, in remembrance of his kind attentions."

—Charles Gould, President of the Northern Railroad Company of New Jersey, died recently in Switzerland.

—We learn from the *Davenport Gazette* that "through the resignation of Geo. Wilson, of the Engineer Department the entire government work at Keokuk rapids, Rock Island Rapids and Rock Island bridge, devolves upon Col. J. N. Macomb. Col. Macomb has had a large experience in the improvement of navigation on

western rivers and is one of the oldest and most substantial officers in the Engineer Department of the army. During the late war his service was chiefly with the army of the Potomac, where his position gave him charge of many important works."

—Col. Morgan, one of the first to practice railroad engineering in America, celebrated his eightieth birthday at Dwight, Ill., last summer, at which time 46 of his direct descendants assembled. Notwithstanding his age he still practices his profession. Col. R. P. Morgan, Chief Engineer of the Lafayette, Bloomington & Muncie Railway, is his son.

MECHANICS AND ENGINEERING.

American Bridge Company.

This Chicago company has lately taken the contract for building a bridge for the Chicago & Alton Railroad Company, over the Illinois River, at Little's Landing, where the line now building from Whitehall to Louisiana crosses the river. It is to be a Post's Patent Iron Truss, 1,200 feet long, with a draw bridge 300 feet in length and will cost, approximately, \$100,000.

Sault Ste. Marie Canal.

The *Detroit Tribune* of the 30th ult. says:

"The Lake Superior *Miner* announces that the plans for the improvement and enlargement of the Sault Ste Marie Canal have been decided upon, and that the work will be pushed forward to completion as rapidly as possible. The improvements will consist in deepening and widening the canal, and in building a new basin. The canal will be deepened to fourteen or sixteen feet, and the banks made perpendicular; the present embankments slope at an angle of 45 degrees. With the sides perpendicular many of the smaller vessels can pass each other in the canal, it being about 100 feet wide at the top. The new basin will be built to the north of the present one, and when it is completed the masonry between them will be removed. The estimated cost of the work will be about \$240,000, and two years will be required for its completion, as the greater part of it must be done during the winter, so that it shall not interfere with navigation. At the last session of Congress the government appropriated \$15,000 'for the improvement of the St. Mary's Canal and River,' and it is understood to be the intention of General Poe to use the most of this sum during the coming winter. Meanwhile the Canadian journals are urging the necessity of building a canal around these falls entirely within the limits of the Dominion, making the early action of the American authorities to ward the vessels composing the Red River expedition a test from which they seek to show the need of a home channel which shall not be liable to interruption by a foreign nation. They claim that a canal can be constructed on the Canadian side at comparatively small cost, and yet of such dimensions that it will accommodate the largest class of vessels employed in the Lake Superior trade. They further argue that the increasing traffic which is following the opening of business from Duluth and the Northern Pacific will so increase the upper lake trade that two canals will be imperatively required for the transportation of the products of the Northwest to the seaboard. There seems to be no probability, however, that all this talk will assume any practical shape."

Improved Car Wheel.

A correspondent of the *Iron Age* describes one as follows:

"The perfection of locomotive luxury will be undoubtedly reached when we can be transported easily and noiselessly over the road. The nearest approach to this yet attained is in a wheel lately invented, which is described as follows: The wheel is cast in three parts—the hub, the web, and a plate to which the hub is bolted. Between the axle and the hub is a ring of solid rubber, three inches wide and one inch thick. The effect of this arrangement is that a sudden blow on the web is communicated to the rubber, and hence to the axle. For this wheel it is claimed that it is cheaper, safer, because less liable to break, and more comfortable for the passenger. It reduces the jar to a minimum, and one can read without danger to the eyes while riding at the highest speed. In rounding curves the oscillation is scarcely noticeable, and the noise deadened, affording opportunity for conversation without the usual unpleasant effort."

Permanent Way.

Mr. Thomas L. Shaw, of Omaha, proposes an improved plan for permanent way, which is substantially as follows: Cross-ties are bedded about ten or twelve feet apart with longitudinal sleepers between them underneath each rail. Longitudinal timbers, about 8 by 6 inches, supporting the rails, are then bolted to this bed. To prevent the warping of these timbers, and the consequent variations of gauge, one corner of each timber is beveled—an entirely effectual preventive. The rails are laid so as to meet at points between the cross-ties. This plan requires about the same amount of timber as when

the sleepers consist entirely of cross ties, and the model which has been presented to us for examination exhibits sufficient probable advantage to warrant experiment.

Railroad Manufactures.

D. Rosenberg, Esq., from Prussia, as the representative of heavy foreign capitalists, is about establishing a steel rail mill in St. Louis with a capital of \$1,000,000. He asks St. Louisans to invest \$50,000 in the enterprise, and, at last accounts, he reported twice that amount could be raised if necessary.

There are now ten establishments in Missouri engaged in making pig iron, with a capacity of about 300 tons of iron per day. Four of these establishments are situated in South St. Louis, three near the line of the South Pacific Railroad, and the remainder on the line of the Iron Mountain Railroad.

September Prices of Rails.

Bigelow & Johnson, of No. 48 Pine street, New York, report as follows the prices current for new and old rails for the month of September:

	NEW RAILS.	Gold.	Currency.	Import, tons.
English.....	\$57 50@58 00		\$70 00@71 00	
American.....				
	OLD RAILS.			
Double Heads.....	\$39 50@39 75	45 00@45 50		
T or Flange.....	38 75@39 00	44 50@45 00		3,684
U or Bridge.....	Nominal.			
Total import this month.				3,684
Import since January 1.....				38,274
Total to date.....				41,958

New Rails.—There has been quite a good demand, and several lots of 56 lb English rails have changed hands at \$58, gold. The American mills are full for the present but a few are seeking winter work which could be contracted for at moderate rates.

Old Rails.—Receipts are again light, and with a very active demand; prices have advanced somewhat, but not more than enough to meet the increased cost abroad. Double heads for immediate delivery are scarce and wanted.

The Cincinnati & Newport Bridge.

It having been intimated of late that the Newport and Cincinnati bridge, over the Ohio, was not being constructed in accordance with the law regulating bridges over navigable streams, a committee was appointed, recently, at a meeting of interested citizens, to make an investigation. This committee met on the 24th ult. Mr. Roberts, the engineer, and W. H. Brown, of Pittsburgh, were present, as were the attorneys for the bridge company, and a number of prominent steamboat men. It is claimed by persons in the river interest that the bridge, which will have a draw on the Kentucky side, will, in high water, render navigation through the draw at night precarious, and the use of barges at such times hazardous, while in low water there will not be sufficient for navigation. The representatives of the bridge company claim that the long span is over the main channel, in accordance with the provisions of the law, and that there was no opposition to the erection of the draw on the Newport side. After an interchange of views, the committee adjourned. At the adjourned meeting, a report of the committee was presented stating that an examination had been made, from which the committee are satisfied that the width of span was in conformity with the law, but that the building of a breakwater above the pivot pier was not contemplated by the law, and would form a serious obstruction to navigation. They also found that the location of the pivot opening was not made as near the channel as practicable, as the law directs. Action on the report was postponed one week.

LOCOMOTIVE STATISTICS.

Illinois Central.

The report of S. J. Hayes, Superintendent of Machinery, for the month of July, 1870, affords the following:

Passenger trains.....	112,385
Freight.....	224,791
Construction.....	9,66
Switching.....	41,894
Total.....	388,636
The cost per mile run was	
For oil and waste.....	.76 cts.
For fuel.....	6.37 "
For engineers and firemen.....	5.98 "
For cleaning.....	1.23 "
For repairs.....	11.09 "
Total.....	25.43 "
Cost per mile run, in cents:	
Passenger engines.....	23.15 cts.
Freight engines.....	24.50 "
Construction engines.....	14.16 "
Switching engines.....	27.46 "
Average number of miles run to	
Pint of oil.....	13.76
Ton of coal.....	39.87

The above oil includes that used in headlights and in lamps of engineers. Wood is rated at \$6.50 per cord, coal at \$2.25 per ton, in Illinois and at \$2.50 on Iowa Division; oil, 60c. per gallon; waste, 15c. per pound. Rebuilding, superintending, teaming and all other expendi-

tures appertaining to repairs are included in the above cost of performance of locomotives.

The whole number of locomotives owned by the company is 183, all but two coal burners. The length of the road operated is 939 miles. 11 are undergoing repairs and 11 have had general repairs during the month.

Burlington & Missouri River.

Mr. George Chalender, Master Mechanic of the company, makes the following report for the month of August, 1870:

Miles run by passenger trains.....	40,891
" " freight trains.....	62,959
" " miscellaneous trains.....	37,356
Total number of miles run.....	141,206
The average cost per mile run was:	
For repairs.....	4.75 cts.
For oil, waste and tallow.....	.83 "
For fuel.....	7.05 "
For engineers, firemen and wipers.....	7.18 "
Total cost per mile run.....	20.71 "
The average number of miles run was:	
To one ton of coal.....	43.94
" " pint of oil.....	15.35

Coal is charged at \$3.50 per ton. Forty-five locomotives made mileage during the month, two are in shop, and two were in shop part of the month. All of the locomotives, except two, are coal burners.

MISCELLANEOUS.

—The upper house of the Georgia Legislature has passed a law prohibiting the running of trains between the hours of six in the morning and six in the evening on Sundays.

—The British Post Office Department announces that 'at the request of the Government of Victoria, no letters or other correspondence addressed to that colony will, until further notice, be forwarded by the route of San Francisco and New Zealand.'

—The Central Branch Union Pacific Railroad Company offered a considerable list of special premiums at the Atchison fair for products of Northern Kansas.

—Messrs. S. M. Felton, Wm. G. Moorhead and Isaac Hinkley, of Philadelphia, Executive Committee of the Lake Superior & Mississippi Railroad Company, publish a card stating that complaints have reached them that the power of that company was being exerted to influence Minnesota politics. They say that no officer or employee is authorized to use any influence, and that no employee is to be so influenced by his superior officer. Jay Cooke & Co., also, concur in and sign the card, which was drawn out by the alleged active interference of some of the principal officers of the company in favor of Donnelly and against the Republican party.

—A representative of the Erie Railway was at the Treasury Department, Wednesday, to see about getting that road bonded under the New Inland Port of Entry law. Formal application to be bonded will be made to the Secretary within a few days by the principal railroads between New York and the West; after which the sureties offered must be examined and approved, and the other necessary arrangements made before the act can go into operation.

—Land sales by the Union Pacific Railroad, for September, amount to \$55,731.55.

—A fire at Windsor last Wednesday destroyed 1,200 cords of wood valued at \$7,000, belonging to the Great Western Railway.

—It is expected that five hundred Chinamen will be at work in a few days grading the Midland Railroad, between Pompton and Newton, N. J.

—On the Upper Mississippi, the *La Crosse Leader* says, the Northwestern Union Packet Company are constructing three splendid boats designed to run in the trade from St. Louis to St. Paul, during the regular season of navigation on the upper river, and their capacity, model and style throughout, will entitle them to a place among the first-class steamers of the Lower Mississippi. The first of the trio will appear on the upper waters very shortly, and the other two will follow before the close of navigation. The first is to be called the "City of Quincy," and will be 206 feet long and 49 feet broad.

—At Boston the following railroad dividends are paid this month: Boston & Lowell, 3 per cent.; Burlington & Missouri River, 4 per cent.; Cambridge Horse Railroad, 4½ per cent.; Chelsea Horse Railroad, 4 per cent.; Lowell & Lawrence, 3 per cent.; Malden & Melrose, 3 per cent.; Ogdensburg & Lake Champlain, preferred, 4 per cent.; South Boston, 2½ per cent. The Berkshire Railroad pays no dividend this quarter.

—Edward Wilder, Land Commissioner of the Hannibal & St. Joseph Railroad Company, reports that in the month of September sales of land were made to 1,560 purchasers, amounting to 3,143 97-100 acres and one town lot, for \$39,511.76, an average of \$12.56 per acre.

The Manufacture of Tar Pavement.*

In most provincial towns there are two important bodies of men, the paving commissioners and the gas directors. The one is pledged to keep the rates low, and the other to keep the price of gas as low as will enable them to provide the statutory dividend. As one means of ensuring a cheap supply of gas is to create a greater demand and obtain a better price for the residual products, it is of advantage to consider a subject the adoption of which would be advantageous to both of these bodies. It is not a new one, but has hitherto been a neglected source of revenue to gas companies, and will also be a great benefit to the public. That subject is tar pavement. In some counties, such as Yorkshire, where stone is as abundant as brain is said to be, tar pavement will receive but little attention; but in the eastern and some other counties where the same conditions do not exist, but where York flag costs 7s. per yard laid, tar pavement is a desideratum. In such districts there is a scramble for pavement; and, on account of the high price, unless a paving commissioner reside in the street, it remains unpaved.

Tar pavement may be made of the ordinary cinder-dirt produced in gas-works, of shingle, or of a mixture of both. The material is burnt in heaps like ballast, and when hot is mixed with hot tar. In practice a small fire of coke is made on the ground, and covered with cinder-dirt or shingle. When this layer is hot another is added, and so on in succession until a large enough heap has been provided. The tar is now boiled in an iron copper, and taken when hot and mixed with the hot material from the heap already described, in quantities of two bushels at a time, in about the proportion of one gallon to every bushel of cinder-dirt, and slightly less than a gallon for the gravel. It is turned over and over with the shovel until every part of the material has got a covering of tar. Then the whole is passed through a sieve ½ in. mesh, and part of it through another with ¼ in. mesh, and put in heaps until required. Indeed, it may be kept for months before being laid down.

Before the pavement is laid, an edging should be provided about 2 inches thick, and projecting 2 inches above the surface of the ground to be covered, which should be tolerably even. It is advisable to have the ground next the curb well trodden on and rammed before the pavement is laid, otherwise there will be an unseemly hollow next the curb. In laying, the rough stuff is put down first and rolled tolerably firm, then the second quality is put on, then the third, and when the whole has been raked level, a little of the finest material is sifted on through a sieve with ¼ in. meshes, and a little fine white shingle or Derbyshire spar is sprinkled on the top. The whole must now be well rolled. The best roller is a water ballast roller, which at first is used without ballast, and well wetted to prevent adhesion of the material, and, when the pavement is slightly consolidated, the full weight should be applied.

For heavy cart traffic the material should be made of shingle only, heated and mixed as above, and well rolled. Both descriptions of pavement are laid best and most easily in warm weather, and should be rolled when the sun has warmed it well. Those parts in angles should be well rammed and trimmed off with a light shovel.

Though apparently a simple manufacture, there is a little difficulty in ascertaining the proportion of tar to gravel or cinder-dirt. A little experience will only be necessary in this, as well as in all other manufactures, to enable anyone to carry it out successfully.

This pavement cannot be spoken of too highly, as it is cheap, wears well, and can be easily repaired. The color, which never can be made to equal York flag, and the smell for some time after it is laid are the only objections to its use; it can be laid with a good profit in any district at 1s. 4d. per square yard; and besides being a boon to the public, who must otherwise walk on gravel, is a great advantage to gas companies. To them it provides a remunerative outlet for their tar, which often otherwise must be sold at a low price to distant distillers.

A late paragraph, which appeared in the daily press, states that it is proposed to pave the streets of London with stone laid in asphaltic instead of lime grout. This is just a more systematic application of the above-described plan; for the tar, by being boiled and thrown on hot stones, becomes an elastic asphalt.—*Nature*.

* Paper lately read before the British Association of Gas Managers, by Mr. T. H. Methven.

PUBLISHER'S ANNOUNCEMENTS.

House and Sign Painting.

To such of our readers as desire anything in the line of house-painting, graining or decorating, we can from personal knowledge unqualifiedly recommend Mr. J. Warwick, of this city, as a careful and skillful workman, prompt in his appointments, and conscientious in his charge. Mr. W. is a man of experience in his calling, and will afford entire satisfaction to such as give him their patronage. Orders for him may be left at No. 144 Twentieth street, or No. 728 Cottage Grove avenue.

Drawing Materials.

We would call attention to the advertisement of Messrs. Benoit & Wood, and to their removal from No. 142 to No. 148 Fulton street, New York.

We can personally recommend these gentlemen and their wares, as we have been among their patrons for a number of years. No other house in New York keeps a better assortment of materials and instruments used by draughtsmen and engineers, and if any of our readers are in want of drawing paper, etc., we recommend them to send to these gentlemen for samples, and we feel sure they will find what they want.

WANTS.

Small Advertisements will be inserted under this head at ten cents per line for the first insertion, and five cents per line for each subsequent insertion.

WANTED—Every Railway Traveler in the United States and the Dominion of Canada wants every railway company to use the Thomas Safety Baggage Check. It is in use on over sixty of the best managed roads in the country and has been during the past three years, and not one piece of baggage to which this check has been attached has been lost or mis-carried. Every railroad man upon whose road it is in use says: "We are fully satisfied after a thorough trial and practical use of the Thomas Safety Baggage Check that both for local and through business it has no equal. It is cheaper, more satisfactory and better adapted to the business than any other check in use." All information in reference to the Thomas Safety Baggage Check will be given by addressing G. F. THOMAS, editor Appleton's Railway Guide, 90, 92 and 94 Grand Street, New York.

AN ENGINEER experienced in the construction of Railroads, both as 1st Assistant and as Chief, is at present disengaged. Any parties to whom this notice might be of interest can obtain further information by inquiries of the editor of this paper.

WANTED—By a young CIVIL ENGINEER of four years' experience in the field, a position to take charge of a party or a Division on construction; or would run a transit or level. Apply to "D. F." this office.

A CIVIL ENGINEER, who is thoroughly educated in his profession, has had experience in field work for some years, and is especially familiar with leveling and transit surveying, desires an engagement on a railroad. Address, TRANSIT, at the office of the RAILROAD GAZETTE.

WANTED—By a practical steam fitter and engineer of considerable experience, a situation to run a stationary engine or as locomotive fireman. Inquire at this office.

WANTED—A Civil Engineer of considerable experience in this and the Old Country is open for an engagement as Divisional Engineer, or in any business connected with Surveying—unquestionable references. Address CIVIL ENGINEER, care of Editor RAILROAD GAZETTE.

NOTICE TO CONTRACTORS.

OFFICE OF THE OHIO & MICH. RY CO.,
COLDWATER, Mich., Sept. 26, 1870.

Proposals will be received at this office until October 17, 1870, for the clearing, grubbing, grading, tying and bridging of that portion of the line of the Ohio & Michigan Railway extending from the State Line, in the township of Amboy, through the counties of Hillsdale, Branch, alhoun, Kalamazoo, and to the village of Allegan, in Allegan county, a distance of 95 miles.

Proposals may be made for one or more sections, or for the whole work.

Proposals will state the proportion of cash, and of Capital Stock of the Company, which will be received for the work.

Plans and specifications will be exhibited at this office on and after the 1st of October next.

The Company reserve the right to reject any or all bids, or to accept such only as may seem to the Directors to be for the best interest of the stockholders.

Sealed proposals to be addressed to JOHN S. YOUNGS, Secretary.

By order of the Board of Directors.
HENRY C. LEWIS, President.

ESTABLISHED 1820.

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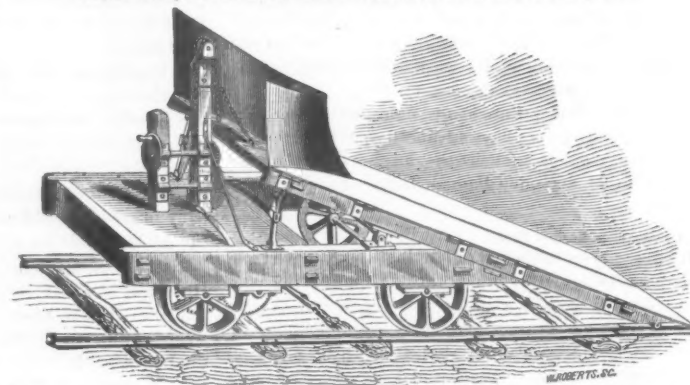
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The accompanying cuts show the application of the Washer. For further information, apply to

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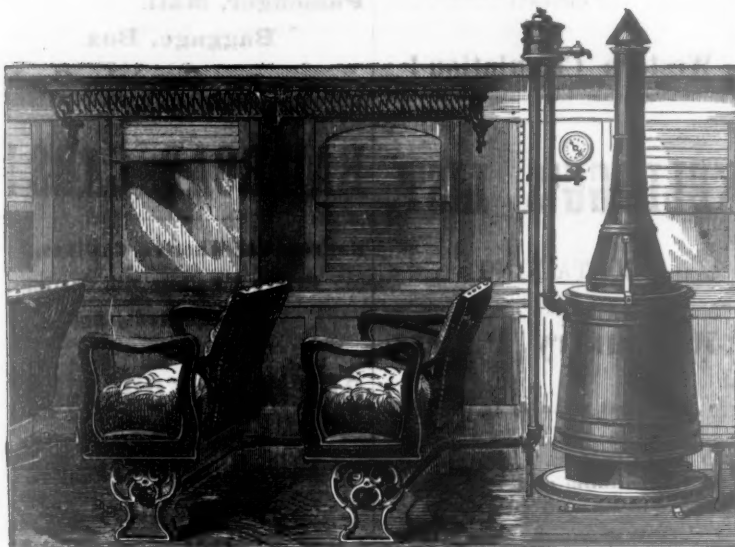
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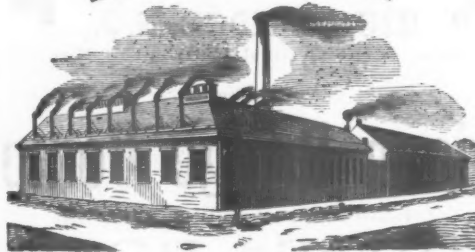
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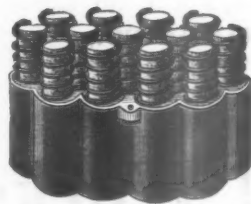
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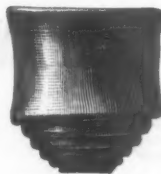
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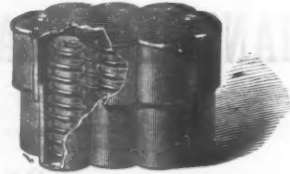
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Volute Buffer Spring.



Group Rubber Center Spiral Spring.

**VOLUTE BUFFER, INDIA RUBBER, RUBBER
CENTRE SPIRAL, COMPOUND SPIRAL,
AND OTHER**

RAILWAY CAR SPRINGS.

No. 1 Barclay St., NEW YORK. | No. 15 La Salle St., CHICAGO.

WORKS ON 129th AND 130th STREETS NEW YORK.

GENERAL FREIGHT DEPARTMENT. The Illinois Central Railroad

ARE PREPARED TO TAKE FREIGHT FOR

**Cairo, St. Louis, Peoria,
BLOOMINGTON, SPRINGFIELD, JACKSONVILLE,**

And All Points in the Central and Southern parts of the State;

MOBILE & NEW ORLEANS BY RAIL OR RIVER

And ALL POINTS on the MISSISSIPPI below CAIRO. Also, to
Freeport, Galena and Dubuque.

Freight Forwarded with Promptness and Despatch, and
Rates at all times as **LOW** as by any other Route.

BY THE COMPLETION OF THE BRIDGE AT DUNLEITH,
THEY ARE ENABLED TO TAKE FREIGHT TO ALL POINTS WEST OF DUBUQUE
WITHOUT CHANGE OF CARS!

DELIVER FREIGHT IN CHICAGO ONLY at the FREIGHT DEPOT of the Com-
pany, foot of South Water St. Parties ordering Goods from the East should have the packages marked:

"Via Illinois Central Railroad."

For THROUGH BILLS OF LADING, and further information,
apply to the LOCAL FREIGHT AGENT at Chicago, or to the undersigned.

M. HUGHITT, Gen. Supt.

J. F. TUCKER, Gen. Freight Agt.

Geo. C. Clarke & Co.,
FIRE, INLAND AND OCEAN MARINE
INSURANCE AGENCY.

15 Chamber of Commerce, Chicago.

New England M. M. Insurance Co., of Boston,
ASSETS \$1,197,000.

Independent Insurance Company, - of Boston,
ASSETS \$680,000.

North American Fire Ins. Co., of New York,
ASSETS \$800,000.

Excelsior Fire Insurance Co., - of New York,
ASSETS \$340,000.

Fulton Fire Insurance Company, of New York,
ASSETS \$400,000.

Home Insurance Company, - of Columbus, O.
ASSETS \$515,000.

CHAS. J. PUSEY,

P. O. Address—Box 5222.

EDW'D H. PARDEE

Pusey & Pardee,

74 BROADWAY, NEW YORK.

American and English Rails,
LOCOMOTIVES AND CARS FISH-PLATES, SPIKES, &c.

—SOLE AGENTS FOR—

Atkins Brothers' Pottsville Rolling Mills, and G.
Buchanan & Co., of London.

Special attention given to filling orders for small T and STREET RAILS, of every
weight and pattern.

OLD RAILS BOUGHT OR RE-ROLLED, AS DESIRED.



OMNIBUSES

—OF—

EVERY STYLE!

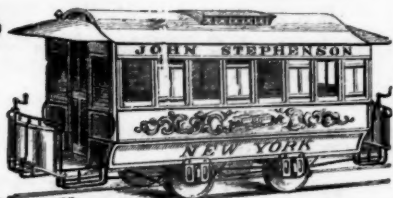
Orders Promptly Filled.

CARS,

LIGHT, STRONG

—AND—

ELEGANT!



THE "RED LINE!"

—RUNNING OVER THE—

Michigan Southern and Lake Shore R. R.'s,

—WAS THE—

FIRST LINE to CARRY FREIGHT BETWEEN the EAST and WEST,
WITHOUT CHANGE OF CARS!

CARS RUN THROUGH TO

NEW YORK AND BOSTON,
IN FOUR AND FIVE DAYS!

Contracts made at the Offices of the Line.

C. Shutter, Agent,
347 Broadway, New York.

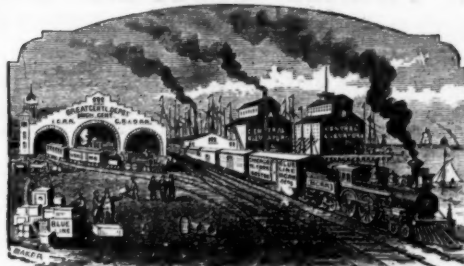
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Old State House, Boston, Mass.

W. D. MANCHESTER, Agent, 54 Clark St., Chicago.

Great Central Route.

"BLUE LINE."

ORGANIZED JANUARY 1, 1867.



1870.

1870.

OWNED AND OPERATED BY THE

Michigan Central, Illinois Central, Chicago, Bur-
lington & Quincy, Chicago & Alton, Great
Western (of Canada), New York Central,
Hudson River, Boston & Albany, and Provi-
dence and Worcester Railroads.

The "BLUE LINE" is the only route that offers to shippers of freight the advantages of an
unbroken gauge through from Chicago to the Seaboard, and to all Interior Points on the line of Eastern
Connections beyond Suspension Bridge and Buffalo. All Through Freight is then transported between
the most distant points of the roads in interest.

WITHOUT CHANGE OF CARS!

The immense freight equipment of all the roads in interest is employed, as occasion requires, for the
through service of this Line, and has of late been largely increased. This Line is now prepared to extend
facilities for the transit and delivery of all kinds of freight in Quicker Time and in Better Order than
ever before.

The Blue Line Cars

are all of a solid, uniform build, thus largely lessening the chances of delay from the use of cars of a
mixed construction, and the consequent difficulty of repairs, while remote from their own roads. The
Blue Line is operated by the railroad companies who own it, without the intervention of intermediate
parties between the Roads or Line and the public.

Trains run through with regularity **IN FOUR OR FIVE DAYS** to and from New York and
Boston. Especial care given to the Safe and Quick Transport of Property Liable to Breakage or Injury,
and to all **Perishable Freight.**

Claims for overcharges, loss or damage, promptly settled upon their merits. Be particular and direct
all shipments to be marked and consigned via

"BLUE LINE."

FREIGHT CONTRACTS given at the offices of the company in Chicago, New York
and Boston.

J. D. HAYES, GEN. MANAGER, Detroit

C. E. NOBLE, 349 Broadway, N. Y. P. K. RANDALL, 69 Washington St., Boston
GEO. E. JARVIS, 349 Broadway, N. Y. W. W. STREET, 91 Lake St., Chicago
N. D. MUNSON, Quincy, Ill. J. JOHNSON, Cairo, Ill.

THOS. HOOPS, GEN. FR'T AGT. Michigan Central Railroad, Chicago.
A. WALLINGFORD, AGT. M. C. & G. W. R. R., No. 91 Lake St., Chicago.
N. A. SKINNER, Freight Agent Michigan Central Railroad.

Empire Line.

THE EMPIRE TRANSPORTATION COMPANY'S

Fast Freight Line to the East

—AND—

TO THE COAL AND OIL REGIONS,

Via Michigan Southern, Lake Shore, and Philadelphia & Erie R. R.'s,
WITHOUT TRANSFER!

Office, No. 72 LaSalle Street, Chicago.

GEO. W. RISTINE, Western Superintendent, Cleveland, Ohio.

W. G. Van Demark, 265 Broadway, New York. E. L. O'Donnell, Baltimore, Md.
G. B. McCulloch, 42 South 5th St., Philadelphia. Wm. F. Smith, Erie, Penn.

JOHN WHITTAKER, Pier 14 North River, New York.

JOSEPH STOCKTON, Agent, Chicago.

W. T. HANCOCK, Contracting Agent.

WM. F. GRIFFITHS, Jr., Gen. Freight Agent, Philadelphia.

CHICAGO, ROCK ISLAND & PACIFIC RAILROAD.

THE DIRECT ROUTE FOR
JOLIET, MORRIS, OTTAWA, LASALLE, PERU, HENRY, PEORIA,
Lacon, Geneseo, Moline,
ROCK ISLAND, DAVENPORT,
Muscatine, Washington, Iowa City,
GRINNELL, NEWTON, DES MOINES,

COUNCIL BLUFFS & OMAHA!

CONNECTING WITH TRAINS ON THE UNION PACIFIC RAILROAD, FOR

Cheyenne, Denver, Central City, Ogden, Salt Lake,
White Pine, Helena, Sacramento, San Francisco,

And Points in Upper and Lower California; and with Ocean Steamers at San Francisco, for all Points in
China, Japan, Sandwich Islands, Oregon and Alaska.

TRAINS LEAVE their Splendid new Depot, on VanBuren Street, Chicago, as follows:

	LEAVE	ARRIVE
PACIFIC EXPRESS, (Sunday excepted).....	10.00 a. m.	3.35 p. m.
PERU ACCOMMODATION, (Sundays excepted).....	5.00 p. m.	9.50 a. m.
PACIFIC EXPRESS, (Saturdays excepted,).....	10.00 p. m. (Mon. ex. 6.00 a. m.)	

ELEGANT PALACE SLEEPING COACHES!

Run Through to Peoria and Council Bluffs, Without Change.

Connections at LA SALLE, with Illinois Central Railroad, North and South; at PEORIA, with
Peoria, Pekin & Jacksonville Railroad, for Pekin, Virginia, &c.; at PORT BYRON JUNCTION, for
Hampton, LeClaire, and Port Byron; at ROCK ISLAND, with Packets North and South on the Miss
issippi River.

For Through Tickets, and all desired information in regard to Rates, Routes, etc., call
at the Company's Office, No. 37 South Clark Street, Chicago, 413 California Street, San Francisco, or
257 Broadway, New York.

A. M. SMITH, Gen. Pass. Agent. HUGH RIDDLE, Gen. Supt. P. A. HALL, Asst. Gen. Supt.

Leavenworth, Lawrence,

— AND —

GALVESTON R. R. LINE, OF KANSAS.

Two Distinct Lines of Road from Kansas City, Mo., and Lawrence, Kan.,

Uniting at OTTAWA, and from thence as a Trunk Line to

INDIAN TERRITORY.

The SHORTEST and ONLY DIRECT ROUTE to the celebrated Neosho
and Verdigris Valleys of Kansas, and will be opened for business
to the Border of Indian Territory, by Nov. 1st, 1870.

FIVE DAILY TRAINS, Each Way, connecting at LAWRENCE with trains the
KANSAS PACIFIC ROAD, for WEST and NORTH and at KANSAS CITY with ALL ROADS FOR
THE EAST and NORTH, at end of Track with KANSAS STAGE CO.'S LINE OF COACHES for all parts of

INDIAN TERRITORY, TEXAS & NEW MEXICO.

Ask for Tickets via L. L. & G. R. R., for all points in Southern Kansas.
Freight taken from any part of the East to end of track WITHOUT BREAKING BULK.

CHAS. B. PECK,
Gen. Freight and Ticket Agent, Lawrence, Kan.

M. R. BALDWIN,
Superintendent, Lawrence, Kan.

The Great Favorite Route for Missouri, Nebraska and Iowa.

KANSAS CITY, ST. JOSEPH

— AND —

COUNCIL BLUFFS

THROUGH LINE!

3 EXPRESS PASSENGER TRAINS Leave Union Depot Daily, on the arrival of Eastern
Southern and Western Trains, crossing the Missouri River on the New Iron Bridge at KANSAS
City, passing the cities of

LEAVENWORTH, ATCHISON, SAINT JOSEPH,

— AND —

NEBRASKA CITY.

Connecting at COUNCIL BLUFFS with Iowa Lines for all prominent points in Iowa, and making
DIRECT CONNECTION at OMAHA with the Great Union Pacific Railroad, for

CHEYENNE, DENVER, SALT LAKE, SACRAMENTO, SAN FRANCISCO,
And the Pacific Coast.

Pullman's Palace Sleeping Cars!

ON ALL NIGHT TRAINS.

Ask for Tickets via the People's Route, Kansas City, St. Joseph & Coun-
cil Bluffs Railroad Line.

A. L. HOPKINS,
Gen. Superintendent, ST. JOSEPH, Mo.

A. C. DAWES,
Gen. Passenger Agent, ST. JOSEPH, Mo.

Milwaukee & St. Paul R. W.

THE ONLY ALL RAIL LINE TO

ST. PAUL AND MINNEAPOLIS!

AND ALL PORTIONS OF

Wisconsin, Minnesota & Northern Iowa.

PURCHASE TICKETS VIA MILWAUKEE.

Passengers Going via Milwaukee,

Have Choice of Seats in Clean Coaches, and on Night
Trains, a full night's rest in Palace Sleeping Cars.

BAGGAGE CHECKED THROUGH BY THIS ROUTE ONLY!

PASSENGERS FROM CHICAGO can obtain these Advantages only by
the MILWAUKEE DIVISION of the CHICAGO & NORTHWESTERN R.R.

SPECIAL NOTICE.—Passengers destined to any place
in Wisconsin, Minnesota, or Northern Iowa, either on or off the
Lines of this Company, who cannot procure Through Tickets to
their destination, should purchase their Tickets TO MILWAU-
KEE, as this is the Great Distributing Point for these States.

A. V. H. CARPENTER,
Gen. Pass. Agt. Milwaukee.

S. S. MERRILL,
Gen. Manager, Milwaukee.

KANSAS PACIFIC RAILWAY.

Great Smoky Hill Route,

Now Completed and Open for Business Through to

DENVER, COLORADO,

There Connecting with the DENVER PACIFIC RAILROAD for CHEYENNE, forming,
in Connection with the UNION and CENTRAL PACIFIC RAILROADS,
another ALL-RAIL ROUTE to

CALIFORNIA, NEVADA, UTAH, MONTANA, WYOMING, COLORADO, &c.

The most available Passenger and Freight Route to Lawrence, Topeka, Junction City, Abilene, Salina,
Hays, KIT CARSON, River Bend, DENVER, CHEYENNE, OGDEN, SALT LAKE CITY,

Sacramento, and San Francisco.

Close Connections are made in Union Depots at KANSAS CITY and STATE LINE with Ex-
press Trains of the HANRIBAL & ST. JOSEPH, NORTH MISSOURI and MISSOURI PACIFIC RAILROADS.
Southern Overland Passenger and Mail Coaches leave Kit Carson daily for Pueblo, Trinidad, Fort
Union, Santa Fe, &c.

Hughes & Co.'s Splendid Concord Coaches leave Denver daily for Central City, Georgetown, &c.
Passenger and Freight Rates always as low and conveniences as ample as by any other Route.

PULLMAN'S PALACE CARS ACCOMPANY NIGHT EXPRESS TRAINS.

Through Tickets can be obtained at all principal ticket offices. Be careful to ask for tickets
via Kansas Pacific Railway, "Smoky Hill Route."

5,000,000 Acres of Farming Lands For Sale!

Situated along the line of this Great National Railway. For particulars, address JNO. P. DEVEREUX,
Land Commissioner, Lawrence, Kansas.

R. B. GEMMELL, Gen. Freight & Ticket Agt.

A. ANDERSON, Gen. Supt.

THE ERIE & PACIFIC DISPATCH CO.

Are Authorized Freight Agents.

For information, Contracts, and Bills of Lading, apply at their office, 64 Clark Street, Chicago.

H. H. RAPP, AGT.

MARSH & GOODRIDGE.

256 STH WATER ST. CHICAGO.

Dealers in

R. R. Cross-Ties, Telegraph Poles,

FENCE POSTS, BRIDGE TIMBER,

Piles, Hard-wood Plank, &c., &c.,

To which the Attention of Railroad Contractors and Purchasing
Agents is respectfully called.

REFER TO:—Jas. M. Walker, Chicago, Pres't L. L. & G. R. R.; Jas. E. & Wm. Young, Chicago,
Railroad Builders; H. J. Higgins, Purchasing Agent C. B. & Q. R. R.; and Railroad Officers and Pur-
chasing Agents generally.

MARSH & GOODRIDGE,

256 South Water St., Chicago.

CHICAGO & NORTHWESTERN R. W.

Comprising the PRINCIPAL RAILROADS from CHICAGO Directly NORTH NORTH-WEST and WEST.

ALL RAIL TO THE PACIFIC OCEAN!

Great California Line.

TRAINS LEAVE WELLS STREET DEPOT AS FOLLOWS:

8:15 A. M. Cedar Rapids Pass 9:15 P. M. Night Mail.
10:30 A. M. Pacific Express. 9:15 P. M. Rock Island Pass.
10:30 A. M. Rock Island Exp. 4:00 P. M. Dixon Passenger.
For Sterling, Rock Island, Fulton, Clinton, Cedar Rapids, Boone, Denison, Missouri Valley Junction, Sioux City, Council Bluffs and Omaha, there connecting with the

UNION PACIFIC R. R.

For Cheyenne, Denver, Ogden, Salt Lake, the White Pine Silver Mines, Sacramento, San Francisco, and all parts of Nebraska, Colorado, New Mexico, Arizona, Wyoming, Montana, Idaho, Utah, Nevada, and the PACIFIC COAST.

FROM CHICAGO	Hours	1st Class Fare	FROM CHICAGO	Days	1st Class Fare
To OMAHA.....	23	\$20.00	To SACRAMENTO.....	4 1/2	\$118.00
" DENVER.....	52	70.75	" SAN FRANCISCO.....	5	118.00

TRAINS ARRIVE:—Night Mail, 7:00 a. m.; Dixon Passenger, 11:10 a. m.; Pacific Express, 3:50 p. m.; Rock Island Express, 3:50 p. m.; Cedar Rapids Passenger, 6:50 p. m.

FREEPORT LINE.

9.00 A. M. & 9.45 P. M. For Belvidere, Rockford, Freeport, Galena, Dunleith, and St. Paul.
4.00 P. M., Rockford Accommodation.
5.30 P. M., Geneva and Elgin Accommodation
6.10 P. M., Lombard Accommodation.
5.50 P. M., Junction Passenger.

TRAINS ARRIVE:—Freeport Passenger, 2:30 a. m.; 3:00 p. m.; Rockford Accommodation, 11:10 a. m.; Geneva and Elgin Accommodation, 8:45 a. m.; Junction Passenger, 8:10 a. m.; Lombard Accommodation, 6:50 a. m.

WISCONSIN DIVISION.

Trains leave Depot, cor. West Water and Kinzie Sts., daily, Sundays excepted, as follows:
10.00 A. M. DAY EXPRESS, for Janesville, Monroe, Whitewater, Madison, Prairie du Chien, Watertown, Minnesota Junction, Portage City, Sparta, La Crosse, St. Paul, and ALL POINTS ON THE UPPER MISSISSIPPI RIVER; Ripon, Berlin, Fond du Lac, Oshkosh, Neenah, Appleton, and Green Bay.

3.00 P. M., Janesville Accommodation.
5.00 P. M. NIGHT EXPRESS, for Madison, Prairie du Chien, Watertown, Minnesota Junction, Portage City, Sparta, La Crosse, St. Paul, and ALL POINTS ON THE UPPER MISSISSIPPI RIVER; Ripon, Berlin, Fond du Lac, Oshkosh, Neenah, Appleton, Green Bay, and THE LAKE SUPERIOR COUNTRY.

5.30 P. M., Woodstock Accommodation.
6:20 P. M., Barrington Passenger.

TRAINS ARRIVE:—5:30 a. m., 7:45 a. m., 1:10 a. m., 1:00 p. m., and 7:15 p. m.

MILWAUKEE DIVISION.

MILWAUKEE MAIL, (ex. Sun.) Waukegan, Kenosha, Racine and Milwaukee, 8:00 A. M.
EXPRESS, (ex. Sun.) Waukegan, Kenosha, Racine and Milwaukee, 9:45 A. M.
EVANSTON PASSENGER, 11:40 A. M.
HIGHLAND PARK PASSENGER, 1:15 P. M.
MILWAUKEE ACCOMMODATION, with Sleeping Car attached, 1:30 P. M.
EVANSTON ACCOMMODATION, (Daily,) from Wisconsin Div. Depot, 1:30 P. M.
KENOSHA ACCOMMODATION, (Sundays excepted) from Wells St. Depot, 4:15 P. M.
AFTERNOON PASSENGER, from Milwaukee Div. Depot, 5:00 P. M.
WAUKEGAN ACCOMMODATION, (except Sundays) from Wells St. Depot, 5:25 P. M.
WAUKEGAN PASSENGER, (Sundays excepted) from Wells St. Depot, 6:15 P. M.

TRAINS ARRIVE:—Night Accommodation, with Sleeping Car, 5:00 a. m.; Day Express, 4:10 p. m.; Milwaukee Mail, 10:10 a. m.; Afternoon Passenger, 8:00 p. m.; Waukegan Accommodation, 8:25 a. m.; Kenosha Accommodation, 9:10 a. m.; Evanston Accommodations, 1:40 and 4:00 p. m.; Waukegan Passenger, 7:55 a. m.; Highland Park Passenger, 3:45 p. m.

PULLMAN PALACE CARS ON ALL NIGHT TRAINS.

THROUGH TICKETS Can be purchased at all principal Railroad Offices East and South, and in Chicago at the Southeast corner of Lake and Clark Streets, and at the Passenger Stations as above.

H. P. STANWOOD,
Gen. Ticket Agt.

GEO. L. DUNLAP,
Gen'l Supt.

Western Union Railroad.

CHICAGO & NORTHWESTERN DEPOT, | MILWAUKEE & CHICAGO DEPOT,
CHICAGO. | MILWAUKEE.

THE DIRECT ROUTE!

CHICAGO, RACINE & MILWAUKEE,
—TO—

Beloit, Savanna, Clinton, Pt. Byron, Davenport, Mineral Point,
Madison, Freeport, Fulton, Lyons, Rock Island, Sabula,
Galena, Dubuque, Des Moines, Council Bluffs,

OMAHA, SAN FRANCISCO

AND ALL PRINCIPAL POINTS IN

Southern and Central Wisconsin, Northern Illinois, and Central and Northern Iowa.

FRED. WILD,
Gen. Ticket Agent.

D. A. OLIN,
Gen. Superintendent.

CRERAR, ADAMS & CO.,

MANUFACTURERS AND DEALERS IN

Railroad Supplies!

—AND—

CONTRACTORS' MATERIAL.

11 and 13 Wells Street,

CHICAGO, ILL.



Manufacturers of IMPROVED HEAD-LIGHTS for Locomotives, Hand and Signal Lamps, Car and Station Lamps, Brass Dome Casings, Dome Mouldings, Cylinder Heads, and Car Trimmings, of Every Description.

Pan-Handle —AND— Penn'a Central Route East!

SHORTEST AND QUICKEST ROUTE, VIA COLUMBUS, TO
PITTSBURGH, BALTIMORE, PHILADELPHIA & NEW YORK

On and after Saturday, JULY 10th, 1870, Trains for the East will run as follows:

[DEPOT CORNER CANAL AND KINZIE STS., WEST SIDE.]

8:10 A. M. DAY EXPRESS.

[SUNDAYS EXCEPTED.] Via Richmond. Arriving at

COLUMBUS... 2:35 A. M. | HARRISBURG... 10:35 P. M. | NEW YORK... 6:40 A. M. | WASHINGTON... 5:50 A. M.
PITTSBURGH... 12:00 M. | PHILADELPHIA... 8:10 A. M. | BALTIMORE... 2:30 A. M. | BOSTON... 5:05 P. M.

7:40 P. M. NIGHT EXPRESS.

[SATURDAYS EXCEPTED.] Arriving at:

COLUMBUS... 11:15 A. M. | HARRISBURG... 5:10 A. M. | NEW YORK... 12:10 P. M. | WASHINGTON... 1:10 P. M.
PITTSBURGH... 7:05 P. M. | PHILADELPHIA... 9:35 A. M. | BALTIMORE... 9:00 A. M. | BOSTON... 11:50 P. M.

Palace Day and Sleeping Cars

Run Through to COLUMBUS, and from Columbus to NEW YORK, WITHOUT CHANGE!

ONLY ONE CHANGE TO NEW YORK, PHILADELPHIA, OR BALTIMORE!

CINCINNATI & LOUISVILLE AIR LINE SOUTH.

35 Miles the Shortest Route to Cincinnati.

18 Miles the Shortest Route to Indianapolis and Louisville.

2 Hours the Quickest Route to Cincinnati!

THE SHORTEST AND BEST ROUTE TO

Columbus, Chillicothe, Hamilton, Wheeling, Parkersburg, Evansville,
Dayton, Zanesville, Marietta, Lexington, Terre Haute, Nashville,

ALL POINTS IN CENTRAL & SOUTHERN OHIO, & INDIANA, KENTUCKY & VIRGINIA.

— QUICK, DIRECT AND ONLY ALL RAIL ROUTE TO —

New Orleans, Memphis, Mobile, Vicksburg, Charleston, Savannah,
AND ALL POINTS SOUTH.

Cincinnati, Indianapolis and Louisville Trains run as follows:

THROUGH WITHOUT CHANGE OF CARS!

8:10 A. M. 7:40 P. M.

(Sundays excepted) Arriving at

LOGANSPORT.....	1:15 P. M.	LOGANSPORT.....	1:30 A. M.
KOKOMO.....	2:35 P. M.	KOKOMO.....	2:45 A. M.
CINCINNATI.....	9:30 P. M.	CINCINNATI.....	10:30 A. M.
INDIANAPOLIS.....	5:00 P. M.	INDIANAPOLIS.....	5:40 A. M.
LOUISVILLE.....	11:30 P. M.	LOUISVILLE.....	3:50 P. M.

Lausung Accommodation: Leaves 5:10 P. M. Arrives 8:55 A. M.

PULLMAN'S PALACE SLEEPING CARS!

Accompany all Night Trains between Chicago and Cincinnati or Indianapolis.

Ask for Tickets via COLUMBUS for the East, and via "THE AIR LINE" for Cincinnati, Indianapolis, Louisville and points South. Tickets for sale and Sleeping Car Berths secured at 95 RANDOLPH STREET, CHICAGO, and at Principal Ticket Offices in the West and Northwest.

WM. L. O'BRIEN,
Gen. Pass. and Ticket Agent, Columbus.

I. S. HODSDON,
Northwestern Pass. Agt., Chicago.

D. W. CALDWELL Gen Supt. Columbus.

MOORE Steel Elastic Car Wheel Co.

OF NEW JERSEY.

Proprietors of

MOORE'S PATENT

FOR THE MANUFACTURE OF

ELASTIC CAR WHEELS

FOR PASSENGER AND SLEEPING COACHES.

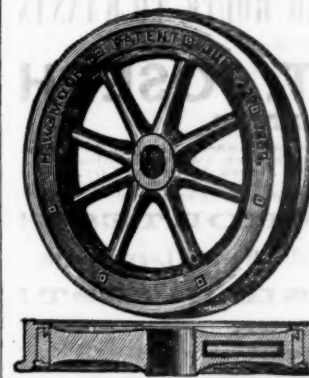
Noiseless, Safe, Durable and Economical.

Also, Manufacturers of

CAR WHEELS OF EVERY DESCRIPTION.

H. W. MOORE, President.
JAS. K. FROTHINGHAM, Secretary.
F. W. BLOODGOOD, Treasurer

Works, cor. Green and Wayne Sts., JERSEY CITY, N. J.
P. O. Address—Box 129, Jersey City, N. J.



American Compound Telegraph Wire.

More than 3000 Miles now in Operation.

Demonstrating beyond question its superior working capacity, and great ability to withstand the elements. For RAILROAD LINES, connecting a single wire with a large number of Stations, and for long circuits, this wire is peculiarly adapted; the large conducting capacity secured by the copper, with other advantages, rendering such lines fully serviceable during the heaviest rains.

Having a core of steel, a small number of poles only are required, as compared with iron wire construction, thereby preventing much loss of the current from escape and very materially reducing cost of maintenance. OFFICE AMERICAN COMPOUND TELEGRAPH WIRE CO., 234 West 29th Street, New York.

BLISS, TILLOTSON & CO., Western Agents,
247 South Water Street, Chicago.

THE FAVORITE THROUGH PASSENGER ROUTE!

Chicago, Burlington & Quincy RAILROAD LINE.

3 THROUGH EXPRESS TRAINS DAILY!

FROM CHICAGO	Hours.	1st Class Fare.	FROM CHICAGO	Days.	1st Class Fare.
TO OMAHA, - - -	23	\$20.00	TO DENVER, - - -	2 1/2	\$68.70
" ST. JOSEPH, - - -	21	19.50	" SACRAMENTO, - - -	4 1/2	118.00
" KANSAS CITY, - - -	22	20.00	" SAN FRANCISCO, - - -	5	118.00

TRAINS LEAVE CHICAGO from the Great Central Depot, foot of Lake Street, as follows:

BURLINGTON, KEOKUK, COUNCIL BLUFFS & OMAHA LINE.

7:40 A. M. MAIL AND EXPRESS. (Except Sunday,) stopping at all stations; making close connections at Mendota with Illinois Central for Amboy, Dixon, Freeport, Galena, Dunleith, Dubuque, LaSalle, El Paso, Bloomington, &c.

10:45 A. M. PACIFIC FAST LINE. (Except Sunday,) stopping at Riverside, Hinsdale, Aurora, Leland, Mendota, Princeton, Buda, Kewanee, Galva, Galesburg, and all Stations West and South of Galesburg.

An ELEGANT DAY COACH and a PULLMAN PALACE DRAWING ROOM CAR is attached to this train daily from Chicago.

TO COUNCIL BLUFFS & OMAHA WITHOUT CHANGE!

5:00 P. M. EVENING EXPRESS. (Daily, except Sunday,) in direct connection with the celebrated New York and Chicago Lightning Express Trains of all Eastern Lines, for Burlington, Ottumwa, Des Moines, Nebraska City, Council Bluffs, Omaha, and all points West. Pullman Drawing-Room Sleeping Car attached to this Train daily from Chicago to Ottumwa without change!

11:30 P. M. NIGHT EXPRESS. (Daily, except Saturday,) stopping at all principal stations between Chicago and Burlington. ELEGANT DAY COACHES, and a PULLMAN PALACE SLEEPING CAR are attached to this train from Chicago to Burlington, without change! This is the only Route between

CHICAGO, COUNCIL BLUFFS & OMAHA,

— RUNNING THE CELEBRATED —

Pullman Palace Dining Cars!

49 MILES THE SHORTEST ROUTE BETWEEN

Chicago & Keokuk,

And the Only Route Without Ferrying the Mississippi River!

QUINCY, ST. JOSEPH, LEAVENWORTH & KANSAS CITY LINE.

10:45 A. M. PACIFIC EXPRESS. (Daily, except Sunday,) with SLEEPING CARS attached, running through from Chicago to KANSAS CITY, Without Change!

5:00 P. M. EVENING EXPRESS. (Daily, except Sunday,) with Pullman Palace Drawing Room Sleeping Car attached, running through from Chicago to QUINCY, Without Change!

11:30 P. M. NIGHT EXPRESS. (Daily, except Saturday,) with Pullman Palace Drawing Room Sleeping Car attached from Chicago to GALESBURG; PALACE DAY COACHES from Chicago to QUINCY, Without Change!

64 MILES THE SHORTEST AND ONLY ROUTE BETWEEN

Chicago and Kansas City!

WITHOUT CHANGE OF CARS OR FERRY.

115 MILES The Shortest Route bet. Chicago & St. Joseph.

THE SHORTEST, BEST AND QUICKEST ROUTE BETWEEN CHICAGO AND

Atchison, Weston, Leavenworth, Lawrence,

AND ALL POINTS ON THE KANSAS PACIFIC RY.

Local Trains Leave:

Trains Arrive: Mail and Express, 3:45 p. m.; Atlantic Exp., 4:15 p. m., except Sunday; Night Exp., 9:05 a. m., except Monday; Mendota Passenger, 10:00 a. m.; Aurora Passenger, 8:15 a. m.; Quincy Passenger, 7:30 p. m.; Riverside and Hinsdale Accommodation, 6:50 and 9 a. m. and 5:30 p. m., except Sunday.

Ask for Tickets at a Chicago, Burlington & Quincy Railroad, which can be obtained at all principal offices of connecting roads, and at Company's office in Great Central Depot, Chicago, at as low rates as by any other route.

ROBT HARRIS, Gen'l Superintendent, CHICAGO. **SAM'L POWELL,** Gen'l Ticket Agent, CHICAGO. **E. A. PARKER,** Gen. West. Pass. Agt., CHICAGO.

THE GREAT THROUGH PASSENGER ROUTE TO KANSAS

IS VIA THE OLD RELIABLE

HANNIBAL & ST. JOSEPH SHORT LINE.

Crossing the Mississippi at Quincy and the Missouri at Kansas City on New Iron Bridges; running Three Daily Express Trains, Through Cars and Pullman Sleeping Palaces from Chicago & Quincy to St. Joseph & Kansas City.

The Advantages gained by this Line over any other Route from Chicago, are:

115 MILES THE SHORTEST!

To St. Joseph, Atchison, Hiawatha, Waterville, Weston, Leavenworth,

64 MILES THE SHORTEST!

To Kansas City, Fort Scott, Lawrence, Ottawa,

Garnett, Iola, Humboldt, Topeka, Burlingame, Emporia, Manhattan, Fort Riley, Junction City, Salina, Ellsworth, Hays, Sheridan, Olathe, Paola, Cherokee Neutral Lands, Baxter Springs, Santa Fe, New Mexico, and all points on the KANSAS PACIFIC, and MISSOURI RIVER, FT. SCOTT & GULF R. R's, with which we connect at Kansas City Union Depot.

THIS BEING THE SHORTEST LINE AND QUICKEST, is consequently the cheapest; and no one that is posted thinks of taking any other Route from Chicago to reach principal points in

Missouri, Kansas, Indian Territory, or New Mexico.

DAILY OVERLAND STAGES from west end Kansas Pacific Railway, for Pueblo, Santa Fe, Denver, and points in Colorado and New Mexico.

This is also a most desirable Route, via St. Joseph, to Brownsville, Nebraska City, Council Bluffs, and Omaha, connecting with the Union Pacific Railroad for Cheyenne, Denver, Salt Lake, Sacramento, San Francisco, and the Pacific coast.

Through Tickets for Sale at all Ticket Offices. Baggage Checked Through, and Omnibus Transfers and Ferryage avoided.

P. B. GROAT, Gen. Ticket Agent. **GEO. H. NETTLETON,** Gen. Supt. **HANNIBAL, MO.**

Old, Reliable, Air-Line Route!

CHICAGO, ALTON & ST. LOUIS R. R.

SHORTEST, QUICKEST AND ONLY DIRECT ROAD TO

Bloomington, Springfield, Jacksonville, Alton,

— AND —

ST. LOUIS!

WITHOUT CHANGE OF CARS.

THE ONLY ROAD MAKING IMMEDIATE CONNECTIONS AT ST. LOUIS, WITH MORNING AND EVENING TRAINS!

— FOR —

ATCHISON, LEAVENWORTH, KANSAS CITY,

Lawrence, Topeka, Memphis, New Orleans,

And All Points South and Southwest.

TRAINS leave Chicago from the West-side Union Depot, near Madison Street Bridge.

EXPRESS MAIL, [Except Sundays].....	8:10 A. M.
LIGHTNING EXPRESS, [Except Saturdays and Sundays].....	9:50 P. M.
NIGHT EXPRESS, [Daily].....	6:00 P. M.
JOLLET ACCOMMODATION, [Except Sundays].....	4:40 P. M.
JACKSONVILLE EXPRESS, [Daily].....	6:00 P. M.

Trains arrive at Chicago at 8:00 P. M., 8:30 A. M. and 6:00 A. M. Joliet Accom., 9:40 A. M.

This is the ONLY LINE Between CHICAGO & ST. LOUIS RUNNING

Pullman's Palace Sleeping and Celebrated Dining Cars!

BAGGAGE CHECKED THROUGH.

Through Tickets can be had at the Company's office, No. 55 Dearborn street, Chicago, or at the Depot, corner of West Madison and Canal streets, and at all principal Ticket Offices in the United States and Canada. Rates of Fare and Freight as low as by any other Route.

A. NEWMAN, Gen. Pass. Agent.**J. C. McMULLIN,** Gen. Supt.

North Missouri R. R.

PASSENGERS FOR

KANSAS AND THE WEST,

ARE REMINDED THAT

THE NORTH MISSOURI R. R.

— IS —

11 MILES SHORTER than any other Route!

BETWEEN

St. Louis and Kansas City.

15 Miles Shorter between ST. LOUIS and LEAVENWORTH

— AND —

49 MILES SHORTER TO ST. JOSEPH!

THAN ANY OTHER LINE OUT OF ST. LOUIS.

Three Through Express Trains Daily!

Pullman's Celebrated Palace Sleeping Cars on all Night Trains!

FOR TICKETS, apply at all Railroad Ticket Offices, and see that you get your Tickets via St. Louis and North Missouri Railroad.

C. N. PRATT, Gen. Eastern Agt., **S. H. KNIGHT,** Gen. Superintendent, **111 Dearborn-st. CHICAGO.** **ST. LOUIS.**

JAS. CHARLTON, Gen. Pass. and Ticket Agt., St. Louis.

Pacific Railroad of Missouri.

THE MOST DIRECT AND RELIABLE ROUTE FROM ST. LOUIS THROUGH TO

KANSAS CITY, LEAVENWORTH & ATCHISON,

WITHOUT CHANGE OF CARS!

Close Connections at KANSAS CITY with Missouri Valley, Missouri River, Ft. Scott & Gulf, and Kansas Pacific R'y's, for Weston, St. Joseph, Junction City, Fort Scott, Lawrence, Topeka, Sheridan, Denver, Fort Union, Santa Fe, and

ALL POINTS WEST!

At SEDALIA, WARRENSBURG and PLEASANT HILL, with Stage Lines for Warsaw, Quincy, Bolivar, Springfield, Clinton, Osceola, Lamar, Carthage, Granby, Neosho, Baxter Springs, Fort Gibson, Fort Smith, Van Buren, Fayetteville, Bentonville.

PALACE SLEEPING CARS on all NIGHT TRAINS.

Baggage Checked Through Free!

THROUGH TICKETS for sale at all the Principal Railroad Offices in the United States and Canada. Be Sure and Get your Tickets over the PACIFIC R. R. OF MISSOURI.

W. B. HALE, Gen. Pass. and Ticket Agt.

THOS. McKISOCK, General Superintendent.

THREE HOURS IN ADVANCE OF ALL OTHER ROUTES!

Sixty-One Miles the Shortest Line! Only 27 Hours!

— FROM —

CHICAGO TO NEW YORK.

Pittsburgh, Ft. Wayne & Chicago and Pennsylvania Central

IS THE ONLY ROUTE RUNNING ITS ENTIRE TRAIN THROUGH TO PHILADELPHIA AND NEW YORK, AND THE ONLY ROUTE RUNNING

THREE DAILY LINES OF PULLMAN'S DAY AND SLEEPING PALACES,

— FROM CHICAGO TO —

PITTSBURGH, HARRISBURG, PHILADELPHIA & NEW YORK,

WITHOUT CHANGE!

WITH BUT ONE CHANGE TO

BALTIMORE, PROVIDENCE, NEW HAVEN,
HARTFORD, SPRINGFIELD, WORCESTER AND BOSTON!

And the Most Direct Route to Washington City.

Trains Leave WEST SIDE UNION DEPOT, corner West Madison and Canal Streets, as follows:

LEAVE:	Mail	Fast Express	Pacific Exp.	Night Exp.	VAHARRIS AC.
CHICAGO	5.50 A. M.	11.00 A. M.	5.15 P. M.	9.00 P. M.	4.00 P. M.
PLYMOUTH	9.50 "	1.50 P. M.	9.10 "	2.13 A. M.	4.00 P. M.
FORT WAYNE	12.40 P. M.	3.30 "	11.30 "	5.30 "	4.00 P. M.
LIMA	3.15 "	"	1.25 A. M.	8.10 "	4.00 P. M.
FOREST	4.37 "	"	2.45 "	9.40 "	4.00 P. M.
CRESTLINE	6.00 A. M.	5.55 "	4.30 "	12.05 P. M.	4.00 P. M.
MANASSAS	6.12 "	7.16 "	5.00 "	12.34 "	4.00 P. M.
ORRVILLE	9.05 "	8.42 "	6.45 "	3.27 "	4.00 P. M.
ALLIANCE	10.45 "	9.55 "	8.40 "	3.55 "	4.00 P. M.
ROCHESTER	12.05 P. M.	12.17 A. M.	10.53 "	6.02 "	4.00 P. M.
PITTSBURGH	3.15 "	12.50 "	12.45 P. M.	7.50 "	4.00 P. M.
BLAIRSVILLE BRANCH	6.05 "	"	2.49 "	9.54 "	4.00 P. M.
JOHNSTOWN	6.56 "	"	3.37 "	10.42 "	4.00 P. M.
CRESSON	7.58 "	"	4.35 "	11.45 "	4.00 P. M.
ALTOONA	9.05 "	"	5.45 "	12.35 A. M.	4.00 P. M.
HUNTINGDON	10.31 "	"	7.04 "	1.45 "	4.00 P. M.
LEWISTOWN	11.44 "	"	8.23 "	2.59 "	4.00 P. M.
HARRISBURG	3.10 A. M.	8.23 "	10.45 "	5.30 "	4.00 P. M.
LANCASTER	3.40 "	"	12.15 A. M.	7.00 "	4.00 P. M.
DOWNINGTON	5.00 "	"	1.40 "	8.16 "	4.00 P. M.
ARRIVE:					
PHILADELPHIA	6.30 "	12.30 "	3.10 "	9.40 "	7.00 "
NEW YORK, VIA PHILADELPHIA	10.41 "	3.00 "	6.43 "	1.00 P. M.	10.36 "
NEW YORK, VIA ALLENTOWN	"	3.50 "	"	12.05 P. M.	"
BALTIMORE	"	12.10 "	4.30 "	9.00 A. M.	"
WASHINGTON	"	3.40 "	5.50 "	1.00 P. M.	"
BOSTON	"	9.00 P. M.	5.50 A. M.	5.05 P. M.	11.50 "

BOSTON AND NEW ENGLAND PASSENGERS will find this Route especially Desirable, as it Gives them an opportunity of Seeing the FINEST VIEWS AMONG THE ALLEGHANY MOUNTAINS,

Besides Visiting PITTSBURGH, PHILADELPHIA AND NEW YORK, without extra cost!

All New England Passengers holding Through Tickets, will be Transferred, with their Baggage, to Rail and Boat Connections in NEW YORK, WITHOUT CHARGE.

Close Connections Made at Lima for all Points on the Dayton & Mich. and Cin., Hamilton & Dayton R'ys,

And at CRESTLINE, for CLEVELAND, ERIE, DUNKIRK, BUFFALO, NIAGARA FALLS, and all Points reached via Lake Shore R. R.

THROUGH TICKETS for sale at the Company's Offices, at 65 Clark St., and also at 52 Clark St.; cor. Randolph and Wells St.; at N. E. corner of Randolph and LaSalle Sts.; and at Depot, Chicago. Also at Principal Ticket Offices in the West.

F. R. MYERS, Gen. Pass. and Ticket Agt., P. & F. W. R'y, Chicago. W. C. OLELAND, Gen. Western Pass. Agt., P. Ft. W. & C. R'y, Chicago.

T. L. KIMBALL, Gen. Western Pass. Agent, Penn. Central R. R., Chicago.

The Keystone Bridge Company

OF PITTSBURGH, PENN.

Office and Works, 9th Ward, Pittsburgh, Pa.

Philadelphia Office, 426 Walnut Street.

GENERAL WESTERN OFFICE:—13 Fullerton Block, 94 Dearborn St., CHICAGO, ILL.

This Company possesses unrivaled facilities for manufacturing and erecting every description of Iron and Wooden Railway and Road Bridges, Roofs, Turn-Tables and Buildings, "Linville and Piper" Patent Iron Bridges, Self-Sustaining Pivot Bridges, Suspension Bridges, and Ornamental Park Bridges. Contractors for Wooden or Iron Bridges of any pattern, as per plans and specifications. Circulars sent on application.

WALTER KATTE, ENGINEER.

A. D. CHERRY, SECRETARY.

PITTSBURGH CAST STEEL SPRING WORKS.

A. French & Co.,

Manufacturers of Extra Tempered, Light Elliptic

CAST STEEL SPRINGS,

FOR RAILROAD CARS AND LOCOMOTIVES,

FROM BEST CAST STEEL.

OFFICE AND WORKS:—Cor. Liberty and 21st Sts., PITTSBURGH, PA.

CHICAGO BRANCH, 88 Michigan Ave.

Broad Gauge! Double Track!

ERIE RAILWAY.

4 EXPRESS TRAINS DAILY!

From Cleveland, Dunkirk and Buffalo, 625 Miles, to New York, WITHOUT CHANGE of Coaches!

The Trains of this Railway are run in DIRECT CONNECTION WITH ALL WESTERN AND SOUTHERN LINES, for

Elmira, Williamsport, Oswego, Great Bend, Scranton, Newburgh,

NEW YORK, ALBANY, BOSTON, PROVIDENCE,

AND PRINCIPAL NEW ENGLAND CITIES.

New and Improved DRAWING ROOM COACHES are attached to the DAY EXPRESS Running THROUGH TO NEW YORK.

SLEEPING COACHES, Combining all Modern Improvements, with perfect Ventilation and the peculiar arrangements for the comfort of Passengers incident to the BROAD GAUGE, accompany all night trains to New York.

CONNECTIONS CERTAIN! as Trains on this Railway will, when necessary, wait from one to two hours for Western trains.

All Trains of Saturday run directly Through to New York.

Ask for Tickets via Erie Railway, which can be procured at 66 Clark Street, Chicago, and at all Principal Ticket offices in the West and Southwest.

L. D. RUCKER, A. J. DAY, WM. R. BARR,
Gen'l Superintendent, New York. | Western Passenger Agent, Chicago. | Gen'l Passenger Agent, New York.

LAKE SHORE — AND — MICHIGAN SOUTHERN R.W.

THE GREAT THROUGH LINE BETWEEN
CHICAGO, BUFFALO & NEW YORK,
WITHOUT CHANGE!

AND THE ONLY RAILWAY
RUNNING PALACE COACHES THROUGH!
— BETWEEN —

CHICAGO & NEW YORK, via BUFFALO
WITHOUT TRANSFER OF PASSENGERS!

All Trains Stop at Twenty-Second Street to Take and Leave Passengers.
Baggage Checked at that Station for all Points East.

4 EXPRESS TRAINS DAILY, [Sundays Excepted], Leave
Chicago from the New Depot, on Van Buren St., at the head of La Salle Street, as follows:

7:30 A. M. MAIL TRAIN.
VIA OLD ROAD AND AIR LINE. SUNDAYS EXCEPTED.
Leaves 22d Street 7:45 A. M. Stops at all Stations. Arrives—Toledo, 6:30 P. M.

11:30 A. M. SPECIAL NEW YORK EXPRESS,
— A AIR LINE. SUNDAYS EXCEPTED.
Leaves—Twenty-Second Street, 11:45 A. M. Arrives—Elkhart, 2:55 P. M.; Cleveland 10:40 P. M.; Buffalo, 4:10 A. M.; New York, 6:30 P. M.; (Chicago Time) Boston, 11:45 P. M.

This Train has **PALACE SLEEPING COACH** Attached, Running
THROUGH TO ROCHESTER, WITHOUT CHANGE!

IN DIRECT CONNECTION WITH
Wagner's Celebrated Drawing-Room Coaches on N. Y. Central R. R.
Only Thirty Hours, Chicago to New York!

5:15 P. M. ATLANTIC EXPRESS (Daily),
VIA OLD ROAD.
Leave—Twenty-Second Street 5:30 P. M. Arrives—Lafayette, 8:10 P. M. (Stops 20 minutes or Supper); arrives at Toledo, 2:50 A. M.; Cleveland, 7:25 A. M. (30 minutes for Breakfast); arrives at Buffalo, 1:30 P. M.; Rochester, 5:10 P. M. (30 minutes for Supper); connects with **sleeping coach** running through from Rochester to Boston without change, making but one change between Chicago and Boston.

NEW AND ELEGANT SLEEPING COACH Attached to this Train, Running
THROUGH from CHICAGO TO NEW YORK WITHOUT CHANGE! Arrives
at NEW YORK, 6:40 A. M.

9:00 P. M. NIGHT EXPRESS
VIA AIR LINE. (DAILY EXCEPT SAT. & SUN.)
Leaves—Twenty-Second Street, 9:15 P. M. Arrives—Toledo, 6:00 A. M. (30 minutes for Breakfast); arrives at Cleveland, 10:35 A. M.; Buffalo, 5:30 P. M.; New York, 11:00 A. M.; Boston, 3:50 P. M.

KALAMAZOO DIVISION.

Leave Chicago 11:30 A. M. Arrive at Kalamazoo 5:30 P. M.;
Grand Rapids, 8:15 P. M.

Leave Chicago 9:00 P. M. Arrive at Kalamazoo 7:10 A. M.;
Grand Rapids, 10:20 A. M.

Elkhart Accommodation leaves Chicago, 3:30 P. M. Arrives
at Elkhart, 8:20 P. M.

There being no heavy grades to overcome, or mountains to cross, the road bed
and track being the smoothest and most perfect of any railway in the United States, this Company run
their trains at a high rate of speed with perfect safety.

Travelers who wish to SAVE TIME and make SURE CONNECTIONS,
purchase Tickets via

LAKE SHORE & MICHIGAN SOUTHERN R'Y.

THE ONLY LINE RUNNING THROUGH BETWEEN CHICAGO AND
BUFFALO, WITHOUT TRANSFER, and in Direct Connection with NEW YORK
CENTRAL RAILROAD and ERIE RAILWAY.

General Ticket Office for Chicago, No. 56 Clark Street.

CHAS. F. HATCH,
General Superintendent, CLEVELAND, OHIO.

F. E. MORSE,
General Western Passenger Agent, CHICAGO, ILL.

ILLINOIS CENTRAL RAILROAD.

PASSENGER TRAINS LEAVE CHICAGO FROM THE GREAT CENTRAL DEPOT, FOOT OF LAKE ST.

ST. LOUIS AND CHICAGO THROUGH LINE.

9:30 A. M. DAY EXPRESS Sundays Ex.
Arriving in ST. LOUIS at 10:15 P. M.

This Train Reaches St. Louis ONE HOUR & FIFTEEN MINUTES in Advance of any other Route!

8:30 P. M. FAST LINE. Saturdays Excepted.
Arriving at ST. LOUIS at 8:00 A. M.

AT ST. LOUIS, Direct Connections are Made FOR
Jefferson City, Sedalia, Pleasant Hill, Macon, Kansas City,
LEAVENWORTH, ST. JOSEPH & ATCHISON,

Connecting at KANSAS CITY for—
LAWRENCE, TOPEKA, JUNCTION CITY, SALINA, SHERIDAN, &c.

CAIRO, MEMPHIS AND NEW ORLEANS LINE.

9:30 A. M. CAIRO MAIL, Sundays Excepted.
Arriving at Cairo 2:30 A. M., Memphis 12:40 P. M., Mobile 9:40 A. M.
Vicksburg 9:30 A. M., New Orleans 11:10 A. M.

8:30 P. M. CAIRO EXPRESS, Except Saturdays.
Arriving at Cairo 3:15 P. M., Memphis 2:30 A. M., Vicksburg 5:00 P. M., New Orleans 1:30 A. M.

4:55 P. M. CHAMPAIGN PASSENGER,
Arriving at Champaign at 11:15 P. M.

THIS IS THE ONLY DIRECT ROUTE TO
Humboldt, Corinth, Grand Junction, Little Rock, Selma, Canton
Grenada, Columbus, Meridian, Enterprise,

MEMPHIS, VICKSBURG, NEW ORLEANS & MOBILE.

At NEW ORLEANS, connections are made for
GALVESTON, INDIANOLA,
And all Parts of Texas.

NOTICE.—This Route is from 100 to 150 MILES SHORTER, and from
12 to 24 HOURS QUICKER than any other.

THIS IS ALSO THE ONLY DIRECT ROUTE TO
DECATUR, TERRE HAUTE, VINCENNES & EVANSVILLE.

Peoria and Keokuk Line.

9:30 A. M. KEOKUK PASSENGER, Sun. Excepted.
Arriving at Chenoa 3:15 P. M., El Paso 4:05 P. M., Peoria 5:40 P. M.,
Canton 7:14 P. M., Bushnell 8:59 P. M., Keokuk 11:26 P. M., Warsaw 12:05 A. M.

Elegant Drawing Room Sleeping Cars

ATTACHED TO ALL NIGHT TRAINS.

Spacious and Fine Saloon Cars!

WITH ALL MODERN IMPROVEMENTS, RUN UPON ALL TRAINS.

BAGGAGE CHECKED THROUGH TO ALL IMPORTANT POINTS.

For Through Tickets, Sleeping Car Berths, Baggage Checks, and information, apply at the office
of the Company in the Great Central Depot, foot of Lake St.

Hyde Park and Oakwoods Train.

LEAVE	ARRIVE	LEAVE	ARRIVE
HYDE PARK TRAIN... 7:30 A. M.	7:45 A. M.	HYDE PARK TRAIN... 3:00 P. M.	3:15 P. M.
HYDE PARK TRAIN... 8:00 A. M.	8:15 A. M.	HYDE PARK TRAIN... 6:10 P. M.	6:25 P. M.
HYDE PARK TRAIN... 12:10 P. M.	1:50 P. M.		

* Sundays Excepted.

W. P. JOHNSON, Gen. Pass. Agent. **M. HUGHITT, Gen. Supt.**

1870. Great Central Route! 1870.

SPEED! COMFORT! SAFETY!

MICHIGAN CENTRAL and GREAT WESTERN RAILWAYS!

The Great Central Route, via Niagara Falls, to

NEW YORK AND NEW ENGLAND.

Pullman's Magnificent Palace Drawing-Room Cars,

— FROM —

CHICAGO TO NEW YORK CITY, WITHOUT CHANGE.

4 PASSENGER TRAINS LEAVE CHICAGO, DAILY EXCEPT SUNDAY.

(DEPOT, FOOT OF LAKE STREET,) as Follows:

5:00 A. M. MAIL TRAIN. Stops at all Stations.

(SUNDAYS EXCEPTED.)

Arrives DETROIT at 5:40 P. M.

11:30 A. M. SPECIAL NEW YORK & BOSTON EXP.

(SUNDAYS EXCEPTED.) Arrives at Michigan City 1:13 P. M.; New Buffalo 1:33; Niles 2:15 (Dinner); Kalamazoo 3:53 P. M.; Battle Creek 4:23; Marshall 4:48; Jackson 5:45; Detroit 7:55; London 12:05 A. M.; Hamilton 2:35 A. M.; Toronto 9:20; Suspension Bridge 3:55; Rochester 7:00 A. M.; Albany, 2:00 P. M.; NEW YORK, 6:25; BOSTON, 11:50 P. M. This train connects at ROCHESTER (7:00 A. M.) with

Wagner's Magnificent Palace Drawing-Room Cars!

RUNNING THROUGH TO NEW YORK, WITHOUT CHANGE!

5:15 P. M. ATLANTIC EXPRESS.

(DAILY.)

Arrives at Michigan City, 7:19 P. M.; Niles 8:30 P. M. [Supper]; Kalamazoo, 10:25 P. M.; Jackson, 1:00 A. M.; Detroit 3:40; London, 8:35 (Breakfast); Hamilton 11:40; Suspension Bridge 1:30 P. M.; Rochester 5:00 P. M.; Albany, 1:30 A. M.; NEW YORK, 6:40 A. M.; BOSTON, 11:00 A. M. A MAGNIFICENT DRAWING-ROOM SLEEPING CAR is attached to this train daily, FROM CHICAGO TO NEW YORK CITY. The celebrated

Hotel Drawing-Room Car is also attached to this Train from Chicago to Rochester!

These, together with ELEGANT DAY CARS TO SUSPENSION BRIDGE, make this Train the favorite Train for all points East.

SPECIAL NOTICE.—Boston and New England Passengers will please notice that this Train now makes direct connection through. A SLEEPING CAR is attached at Rochester at 5:20 P. M., running through to Springfield, Mass., thus avoiding transfer at Albany. Breakfast at Springfield. This Train reaches Springfield early enough second morning to connect with all Trains up and down the Connecticut.

9:00 P. M. NIGHT EXPRESS.

(SAT. & SUN. EXCEPTED.)

Arrives at Michigan City, 11:03 P. M.; Niles, 12:35 A. M.; Kalamazoo, 2:00; Marshall, 2:12; Jackson, 4:25; Grand Trunk Junction, 7:00; Detroit, 7:30; London, 1:45 P. M.; Hamilton, 4:35; Toronto, 9:35; Niagara Falls, 6:15; Buffalo, 7:15 P. M.; Rochester, 9:10; Syracuse, 12:35 A. M.; Rome, 1:55; Utica, 2:25; Albany, 6:30 A. M.; NEW YORK, 10:00 A. M.; BOSTON, 3:40 P. M.

PULLMAN'S PALACE SLEEPING CARS ARE ATTACHED TO THIS TRAIN FROM CHICAGO TO DETROIT,

And from Suspension Bridge to New York.

WE INVITE THE ATTENTION OF THE TRAVELER to the SPLENDID EQUIPMENTS of this FIRST-CLASS LINE TO THE EAST!

FOR THROUGH TICKETS, and any and all information, Sleeping Car accommodations, &c., apply at General Office in Tremont House Block, at office in Great Central Depot; also at No. 60 Clark street, under Sherman House; at Grand Trunk Railway Office, 48 Clark street, or at New York Central Railroad Office, No. 53 Clark street, and at office under Briggs House.

H. E. SARGENT, Gen. Supt. M. C. R. R.

W. K. MUIR, Gen. Supt. Gt. Western R. W.

HENRY C. WENTWORTH, Gen. Pass. Agt.

CHICAGO, INDIANAPOLIS & LOUISVILLE

THROUGH LINE!

— VIA —

MICHIGAN CENTRAL RAILROAD.

THE ONLY ROUTE TO

TO LOUISVILLE, WITHOUT CHANGE OF CARS.

TWO EXPRESS TRAINS Leave Chicago Depot, Foot of Lake as Follows:

9:00 A. M. MORNING EXPRESS.

(EXCEPT SUNDAY.)

Arriving at LaFayette, 2:25 P. M.; Indianapolis, 6:00 P. M.; Louisville, 11:30 P. M.

4:30 P. M. AFTERNOON EXPRESS.

(EXCEPT SATURDAY)

Arriving at Michigan City 6:30 P. M. [Supper]; LaFayette, 11:30 P. M.; Indianapolis, 2:15 A. M.; Louisville, 7:00 A. M.; Nashville, 4:00 P. M.

A GOOD SLEEPING CAR is Attached to this Train Every Night,

And goes from Chicago to Louisville WITHOUT CHANGE!

SPECIAL NOTICE.—This Train stops at Michigan City for Supper, and waits at that point for Michigan Central Atlantic Express East, leaving Chicago at 4:45 P. M. Passengers going South, and wishing as much time in Chicago as possible, can take the 4:45 p. m. Michigan Central Atlantic Express, and connect without fail at Michigan City, with above Through Louisville Express.

THE GREAT BRIDGE ACROSS THE OHIO at Louisville being completed, passengers are relieved of the omnibus transfer.

FOR THROUGH TICKETS, via this line, apply at offices of connecting lines and at all Ticket offices in Chicago.

HENRY C. WENTWORTH, Gen. Pass. Agent.

Michigan Central R. R.

LOCAL CONNECTIONS:

Chicago & Michigan Lake Shore Railroad.

Open from New Buffalo to St. Joseph, Mich.

5:00 A. M. AND 4:30 P. M. Trains from Chicago Connect at New Buffalo.

Kalamazoo, Allegan & Grand Rapids R. R.

Open to Grand Rapids.

11:30 A. M. AND 9:00 P. M. Trains from Chicago Connect at Kalamazoo.

Peninsular Railroad of Michigan.

Open to Charlotte.

5:00 A. M. AND 9:00 P. M. Trains from Chicago Connect at Battle Creek.

Jackson, Lansing & Saginaw Railroad.

Open to Bay City, Mich. Passing through Lansing and Saginaw.

5:00 A. M. AND 9:00 P. M. Trains from Chicago Connect at Jackson.

GRAND TRUNK RAILWAY.

All Michigan Central Trains Connect at Grand Trunk Junction

— FOR —

SARNIA, TORONTO, MONTREAL, PORTLAND, BOSTON, BUFFALO, OGDENSBURG

AND ALL POINTS EAST.

H. E. SARGENT, General Superintendent.

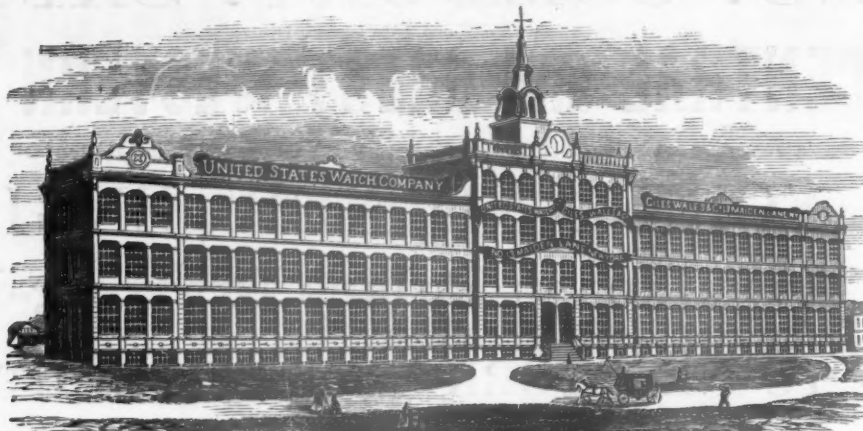
THE UNITED STATES WATCH COMPANY,

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Late Register U. S. Treasury.

NEW YORK, Jan. 17, 1870.

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WATCH No. 1,316, bearing Trade Mark, "Frederic Atherton & Co., Marion, New Jersey," manufactured by the United States Watch Co., has been carried by me a year, its total variation from mean time being about five seconds a month.

L. G. FISHER, JR.,
Rock River Paper Co., Chicago.

WATCH No. 2348, bearing Trade Mark, "Fayette Stratton," manufactured by the United States Watch Co., has been carried by me one year, its total variation from mean time being only a trifle, and its performance has been entirely satisfactory, being by all odds the most accurate time-keeper I have ever carried.

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W. H. HAWKINS,
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The watch bought of you has been carried by me eighteen months, its total variation from mean time being scarcely perceptible.

Yours truly,
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J. L. PICKARD,
Supt. Public Instruction, Chicago.

WATCH No. 1471, bearing Trade Mark, "Frederic Atherton & Co., Marion, New Jersey," manufactured by the United States Watch Co., has been carried by me nearly two years, its total variation from mean time being only about one minute a year.

GEO. M. BOGUE,
Ogden, Sheldon & Co., Chicago.

WATCH No. 2798, bearing Trade Mark, "Fayette Stratton, Marion, New Jersey," manufactured by United States Watch Co., has been carried by me six months, its total variation from mean time being only six seconds.

JOHN M. WOOLHOUSE,
Conductor C. & N. W. Ry, Chicago.

STEM WINDING WATCH No. 1225, bearing Trade Mark, "Frederic Atherton & Co., Marion, New Jersey," manufactured by the United States Watch Co., has been carried by me one year, its total variation from mean time being only two seconds a month. The watch is by far the best watch I have ever carried or handled.

J. F. WARREN,
Of J. F. Warren & Co., 173 Randolph-st., Chicago.

DES MOINES, July 21, 1870.
Messrs. GILES, Bro. & Co.
I take pleasure in saying that the watch I bought of you, being No. 2174, "Fayette Stratton, Marion, New Jersey," made by the United States Watch Co., has given me perfect satisfaction, its total variation from mean time, since regulated, being scarcely perceptible. Yours, etc.,
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